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# YOUNG MAN'S

# COMPANION.



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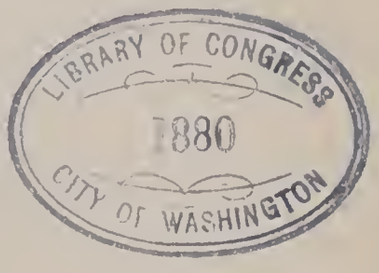
LONDON GEORGE VIRTUE

THE

# YOUNG MAN'S COMPANION,

OR

# YOUTH'S INSTRUCTOR,




BEING A

## MODERN COMPENDIUM OF USEFUL KNOWLEDGE,

INCLUDING

GEOGRAPHY, ASTRONOMY,
HISTORY, BIOGRAPHY, NATURAL PHILOSOPHY,
COMMERCIAL AFFAIRS, &c. &c.

BY J. MAVOR, F.A.S.

A NEW EDITION, WITH THE IMPROVEMENTS IN SCIENCE TO THE PRESENT TIME.

Embellished with a Series of elegant Engravings.

LONDON:
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# PREFACE

## TO THE IMPROVED EDITION.

THE advantages attending the use of Elementary Works like the present, may be justly estimated by the great number of copies which are annually introduced among different branches of the community.

In presenting to the public a new and improved edition of "MAVOR'S YOUNG MAN'S COMPANION," the editor need not remind the reader of the advantageous circumstances in which, compared with former years, every contributor to the stores of useful elementary knowledge is now placed. Within the last few years, almost all the subjects treated of in the present Work have received accessions of important information; and it will be seen, by a reference to the Table of Contents, that it has been the editor's aim to incorporate these materials in the new edition, in such a manner as will, he trusts, materially enhance its value.

In Biography, the death of some of the most eminent individuals, which this or any past age has produced, affords an opportunity of introducing some new and interesting biographical sketches, as those of Canning, Byron, Scott, Wilberforce, &c.

The chapters on the advantages of the Pursuit of Knowledge, and on Commerce, Trade, &c., which are first introduced in the present edition, will be found to contain some general principles of a useful kind, suitable to the present advancing state of society.

In Geography, the vast accessions to our information in relation to countries before unknown, as the effect of modern discoveries, in Africa, near the North Pole, &c. have been appropriately introduced.

In History, the recent convulsions in South America, and the settlement of the different countries in Europe, since the changes effected by the wars of the French revolution, are described.

In Natural Philosophy, Natural History, Astronomy, &c., although the improvements have been on too large a scale to be fully introduced in an elementary Work like the present, yet the editor has endeavoured to notice them in such a manner as shall excite in the reader a desire for more enlarged information.

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THE

# YOUNG MAN'S COMPANION,

*&c. &c.*

## CHAPTER I.

### IMPORTANCE OF THE PURSUIT OF KNOWLEDGE.

One of the finest characteristics of the human family, as distinguished from the other orders of beings by which they are surrounded, is the capacity for progressive improvement in knowledge. The animal creation come into the world in a much more perfect state than man; but then they are incapable of his powers of reflection and reason, by which he is enabled to make constant advances in the attainment of those objects which he desires. It may be said, indeed, that there are instances in which animals have made advances towards improvement; but this may rather be considered as an exception to the rule, for whatever they have of a progressive character, is generally the result of their imitation of man, or of their having become subject to the tuition of the lords of the creation.

Generally speaking, the actions of the inferior animals are governed by instinct, and those of man by reason, though instances might be adduced in which reason and instinct are common to both. Instinct is that disposition or tendency in animals, by which, independently of all instruction or experience, they are unerringly directed to do spontaneously whatever is necessary for the preservation of the individual, or the continuance of their kind. Now the operations of this instinctive principle, whether in man or animals, are generally perfect at once, while those of reason are imperfect, and, in order to obtain any eminence, must be progressive.

The instinct of the inferior animals is admirably illustrated in the conduct of the winged tribes. The youngest pair of birds, it is known, without instruction or experience, build their first nests of the materials commonly used by their species, in situations whose privacy, &c. render them fit to afford them security, and convenient for incubation, and the rearing of their young. It is also certain, that they show equal skill with the oldest and most practised of their tribe, in the neatness, accuracy, and symmetry of their work. When danger, or any other circumstance peculiar to certain countries, renders a deviation from the common form or situations of nests necessary, that deviation is made in an equal degree, and in the very same manner, by all the birds of one species; and it is never found to extend beyond the limits of the country where alone it can serve any good purpose. When removed, by necessity, from their eggs, birds return to them with haste and anxiety, and shift them so as to heat them equally; and it is worthy of observation, that their haste to return is always in proportion to the cold of the climate. "What," says Mr. Addison, "can we call the principle which directs every different kind of bird to observe a peculiar plan in the structure of its nest, and directs all of the same species to work after the same model? It cannot be imitation; for though you hatch a crow under a hen, and never let it see any of the works of its own kind, the nest it makes shall be the same, to the laying of a stick, with all the other nests of the same species. It cannot be reason; for were animals endowed with it to as great a degree as man, their buildings would be as various as ours, according to the various conveniences that they would propose to themselves."

How different is that process by which the youthful human being is destined to acquire, by degrees, a knowledge of all those subjects which render life valuable! This can never be attained but by diligent and persevering exertions, and that from the earliest period in which the intellectual powers begin to expand. How forcibly does this impress us with the importance of using all those means which our beneficent Creator has designed should be in operation for the acquisition of knowledge, and for the improvement of the rational and intellectual, which is the most important part of man!

In the pursuit of this object, one of the most powerful means is early instruction. This is greatly facilitated by a knowledge of books; and a selection of those which most readily promote the purposes of education, is of the utmost importance. It is true, that the earliest instructions are dependent chiefly on the use of the faculty of speech. This is, indeed, a peculiar and valuable

attribute of man, and, doubtless, was in the early ages of the world the only mode by which knowledge was communicated. But had man never possessed any other method of communication than speech, what would have become of all the literary stores of antiquity? how should we have been in possession of the opinions of sages, or the maxims of wisdom, if the sounds which were first articulate only to the ear had not found their way to the understanding, through the medium of written language? If man had not possessed this, or some other extensive power of communication, that astonishing system, which we call the human mind, would have remained in inactivity, its faculties torpid, its energies unexcited, and that capacity of progressive improvement, which forms so important a part of the mental constitution of man, would have been given in vain,—would have been unknown, except to Him who gave it. But in every part of the creation we discern a unity of design, which equally proves the wisdom and benevolence of the great First Cause.

The means of bringing his powers into activity are bestowed upon man, as well as the powers themselves; and it is a position which will bear a rigorous examination, that the accuracy of human thought, and the extent of human intellect, generally proceed in equal steps with the accuracy and extent of language. "This inestimable prerogative," says Smellie, "is perhaps one of the greatest secondary bonds of society, and the greatest improvement to the human intellect. Without artificial language, (*i. e.* that which is capable of being committed to writing or printing,) though nature has bestowed upon every animal a mode of expressing its wants and desires, its pleasures and its pains, what a humiliating figure would the human species exhibit, even upon the supposition that they did associate! But when language and society are conjoined, the human intellect, in the progress of time, arrives at a high degree of perfection. Society gives rise to virtue, honour, government, subordination, arts, sciences, order, and happiness. All the individuals of a community conduct themselves upon a regular system. Under the influence of established laws, kings and magistrates, by the exercise of legal authority, encourage virtue, repress vice, and diffuse, through the extent of their jurisdiction, the happy effects of their administrations. In society, as in a fertile climate, human talents germinate, and are expanded; the mechanical and liberal arts flourish; poets, orators, historians, philosophers, lawyers, physicians, and theologians are produced."

It is to the exercise of that power by which a use is made of the stores of knowledge furnished by written language, that the

succeeding chapters of this work are devoted. The importance of persevering exertions in the pursuit of knowledge from early life, and the necessity of availing ourselves of all those circumstances which have a tendency to promote it, might be illustrated by a multitude of examples; but one or two shall suffice. Sir Isaac Newton, of all men that ever lived, is the one who has most extended the territory of human knowledge; and he used to speak of himself as having been all his life but "a child gathering pebbles on the sea-shore;"—probably meaning, by that allusion, not only to express his modest conviction how mere an outskirt the field of his discoveries was, compared with the vastness of universal nature, but to describe likewise the spirit in which he had pursued his investigations. That was a spirit, not of selection and system-building, but of childlike alacrity, in seizing upon whatever contributions of knowledge nature threw at his feet, and of submission to all the intimations of observation and experiment. On some occasions he was wont to say, that if there was any mental habit or endowment in which he excelled the generality of men, it was that of patience in the examination of the facts and phenomena of his subject. This was merely another form of that teachableness which constituted the character of the man. He loved truth, and wooed her with the unwearying ardour of a lover. Other speculators had consulted the book of nature, principally for the purpose of seeking in it the defence of some favourite theory; partially, therefore, and hastily, as one would consult a dictionary. Newton pursued it as a volume altogether worthy of being studied for its own sake. Hence proceeded both the patience with which he traced its characters, and the rich and plentiful discoveries with which the search rewarded him. If he afterwards classified and systematized his knowledge like a philosopher, he had first, to use his own language, gathered it like a child.

Of all sorts of observations, that which exhibits the most penetrating and watchful philosophy is, when, out of the facts and incidents of every-day experience, a gifted mind, by means of persevering exertions, extracts new and important truths, simply by its new manner of looking at them, and, as it were, by the aid of a light of its own, which it sheds upon their worn and obliterated lineaments. From one of these simple incidents, did Sir Isaac Newton read to the world, for the first time, the system of the universe. It was in the twenty-third year of his age that this extraordinary man was sitting, as we are told, one day in his garden, when an apple fell from a tree beside him. His mind was perhaps occupied, at that fortunate moment, in one of those philosophical

speculations on space and motion, which are known to have, about this time, engaged his attention; and the little incident which interrupted him, was instantly seized upon by his eager spirit, and, by that power which is in genius, assimilated with his thoughts.

The existence of gravitation, or a tendency to fall towards the centre of the earth, was already known, as affecting all bodies in the immediate vicinity of our planet; and the great Galileo had even ascertained the law, or rate, according to which their motion is accelerated as they continue their descent. But no one had yet dreamed of gravitation of the heavens, till the idea now first dimly rose in the mind of Newton. The same power, he said to himself, which has drawn this apple from its branch, would have drawn it from a position a thousand times as high. Wherever we go, we find this gravitation reigning over all things. Why may it not reach to the moon itself? Why may not this be the very power which retains that planet in its orbit, and keeps it revolving as it does around our own earth? It was a splendid conjecture, and we may be sure that Newton instantly set all his sagacity at work to verify it. If the moon, he considered, be retained in her orbit by a gravitation towards the earth, it is in the highest degree probable that the earth itself, and the other planets which revolve around the sun, are, in like manner, retained in their orbits by a similar tendency towards their central and ruling luminary. Proceeding then, in the mean time, upon the supposition, he found by calculation, and by comparing the periods of the several planets, and their distances from the sun, that, if they were really held in their courses by the power of gravity, that power must decrease in a certain proportion, according to the distance of the body upon which it operated.

Supposing then this power, when extended to the moon, to decrease at the same rate at which it appeared to do in regard to the planets, which revolved round the sun, he next set himself to calculate whether its force, at such a distance from the earth, would in reality be sufficient to retain that satellite in its orbit, and to account for its known rate of motion. Now, this step of the discovery was marked by a singular circumstance. In the computations which he undertook for the purpose of this investigation, he naturally adopted the common estimate of the magnitude of the earth, which was at that time in use among our geographers and seamen, and which allowed only sixty English miles to a degree of latitude, instead of sixty-nine and a half, which is the true measurement. The consequence was, that the calculation did not answer; it indicated, in fact, a force of gravity in the moon

towards the earth, less by one-sixth than that which was necessary to give the rate of motion actually possessed by that satellite. By an act of self-denial, more heroic than any other in the annals of intellectual pursuit, Newton dismissed the whole speculation from his mind, even for years. We need hardly state how gloriously this sacrifice was in due time rewarded. A few years after, upon obtaining more correct data, he repeated his calculation, and found it terminate in the very result he had formerly anticipated. The triumph and delight of that moment can hardly be conceived, when he saw, at least, that the mighty discovery was indeed all his own! It is said that such was his agitation as he proceeded, and perceived every figure bringing him nearer to the object of his hopes, that he was at last actually unable to continue the operation, and was obliged to request a friend to conclude it for him.

We are aware that the system of the universe, as first laid down by Newton in consequence of this discovery, has been recently called in question by some more modern philosophers. The author of A Million of Facts has the following observations in relation to this subject. "In his Third Book, Newton thus demonstrates the frame of the system of the world. The phenomena first considered are, 1. That the satellites of Jupiter, by radii drawn to his centre, describe areas proportional to the times of description; and that their periodic times, the fixed stars being at rest, are in the sesquiplicate ratio of their distances from that centre. 2. The same thing is likewise observed of the phenomena of Saturn. 3. The five primary planets, Mercury, Venus, Mars, Jupiter, Saturn, with their several orbits, encompass the sun. 4. The fixed stars being supposed at rest, the periodic times of the said five primary planets, and of the earth about the sun, are in the sesquiplicate proportion of their mean distances from the sun. 5. The primary planets, by radii drawn to the earth, describe areas no ways proportional to the times; but the areas which they describe by radii drawn to the sun, are proportional to the times of description. 6. The moon, by a radius drawn to the centre of the earth, describes an area proportional to the time of description. All which phenomena are clearly evinced by astronomical observations.

"The mathematical demonstrations are next applied by Newton, in the following propositions:—Prop. 1. The forces by which the satellites of Jupiter are continually drawn off from rectilinear motions, and retained in their proper orbits, tend to the centre of that planet, and are reciprocally as the squares of the distances of those satellites from that centre.—Prop. 2. The same thing is true of the primary planets, with respect to the sun's centre.—Prop. 3

The same thing is also true of the moon, in respect of the earth's centre.—Prop. 4. The moon gravitates towards the earth; and by the force of gravity, is continually drawn off from a rectilinear motion, and retained in her orbit.—Prop. 5. The same thing is true of all the other planets, both primary and secondary, each with respect to the centre of its motion.—Prop. 6. All bodies gravitate towards every planet: and the weights of bodies towards any one and the same planet, at equal distances from its centre, are proportional to the qualities of matter they contain.—Prop. 7. There is a power of gravity tending to all bodies, proportional to the several qualities of matter which they contain.—Prop. 8. That a planet performs its orbit between the said force of gravity, and a centrifugal or projectile force originally implanted in them, and continued uniform owing to the motions being performed in spaces, so devoid of matter as not to oppose any sensible resistance; which projectile force was originally a rectilinear motion, from which they have been reflected into orbits, by the attraction of universal gravity.—Prop. 9. That as no mechanical cause can be assigned for the projectile force, none for the gravitating force, and none for the rotation of planets on their axes, so all these phenomena must be referred to the immediate agency of the Supreme Being. These, and many other proportions and corollaries, are proved or illustrated, by a great variety of experiments, in all the great points of physical astronomy.

"The preceding system of Sir Isaac Newton," says the author of A Million of Facts, "being founded on the supposed attractions and repulsions of matter, which are mechanically impossible on the principle of universal attraction of gravitation, assumed on the alleged fall of the moon, sixteen feet in a minute, (whereas it is 128·814 feet,) and on a miraculous projectile force acting in a vacuum,—Sir Richard Phillips has, in contrast, promulgated a system, in which the simple motions, momenta of bodies among one another, are proved to be the proximate causes of all material phenomena." This author next goes on to lay down the fundamental principles of Sir Richard Phillips's system, for which the reader is referred to the above work, page 613, &c.

The author then proceeds more fully to develop his system, for a particular account of which, the reader is referred to the work above quoted. How far this new system of philosophy will be generally received, can be ascertained only by its being brought to the test of reason and experiment. The Newtonian doctrine, though it has been subject to some important modifications, by the ordeal of nearly two centuries, yet continues to be the foundation of the philosophy of the present day. We apprehend the

other system to which allusion has been made, should it even make any converts for a short period, will soon expire.

Another example of the way in which some of the most valuable truths of philosophy have been suggested, for the time, by the simplest incidents of common life, and afterwards confirmed by experiment, is afforded by Galileo's discovery of the regularity of oscillation in the pendulum. It was while standing one day in the metropolitan church of Pisa, that his attention was first awakened to this most important fact, by observing the movements of a lamp suspended from the ceiling, which some accident had disturbed, and caused to vibrate. Now this, or something exactly similar, was a phenomenon which, of course, every one had observed thousands of times before; but yet nobody had ever viewed it with the philosophic attention with which it was on this occasion examined by Galileo. Or if, as possibly was the case, any one had been half unconsciously struck for a moment by that apparent equability of motion, which arrested so forcibly the curiosity of Galileo, the idea had been allowed to escape the instant it had been caught, as relating to a matter not worth a second thought. The young philosopher of Italy (for he had not then reached his twentieth year) saw at once the important applications which might be made of the thought that had suggested itself to him. He took care, therefore, to ascertain immediately the truth of his conjecture, by careful and repeated experiment; and the result was, the complete discovery of the principle of the most perfect measure of time which we yet possess.

But, perhaps, the most striking illustration we can give of the strange manner in which important truths will sometimes hide themselves for a long while from observation, is to be found in the history of the different discoveries relating to the mechanical properties of the air. The knowledge of its positive weight, or gravity, is as old as the days of Aristotle. The common suction-pump is a still older invention; the effect of which depended on the pressure of the atmosphere. But although the air was known to be really a heavy body, nobody, for two thousand years, found out the true reason why, on its removal from the barrel of the pump by the elevation of the piston, the water rose into the vacant space. In the beginning of the last century, when the doctrine of a plenum was in vogue, philosophers were of opinion, that the ascent of water in pumps was owing to the abhorrence of a vacuum, and that by means of suction, fluids might be raised to any height whatever. But Galileo discovered that water could not ascend in a pump unless the sucker reached within thirty-three feet of its surface in the well. Having concluded, that not the

power of suction, but the pressure of the atmosphere, was the cause of the ascent of water in pumps; that a column of water thirty-three feet high was a counterpoise to one of air of an equal base, whose height extended to the top of the atmosphere; and that for this reason the water would not follow the sucker any further; from this Torricelli, Galileo's disciple, took the hint, and considered, that if a column of water of about thirty-three feet in height was equal in weight to one of air having the same base, a column of mercury no longer than about twenty-nine inches and a half would be so too, because mercury being about fourteen times heavier than water, a column of mercury must be fourteen times shorter than one of water equally heavy.

Accordingly, having filled a glass tube with mercury, and inverted it into a bason of the same, he found the mercury in the tube to descend till it stood about twenty-nine inches and a half above the surface of that in the bason. It was, however, some time after the Torricellian experiment had been made, and even after it had been universally agreed that the suspension of the mercury was owing to the weight of the atmosphere, before it was discovered that the pressure of the air was different at different times, though the tube was kept in the same place. But the variations of altitude in the mercurial column were too obvious to remain long unobserved; and, accordingly, philosophers soon became careful enough to mark them.

It was the great Pascal, a man of sublime and universal genius, who, upon hearing of Torricelli's experiment, first made the remark, that the inference which he had deduced from it might, if true, be confirmed beyond the possibility of dispute, by carrying the mercurial tube to a considerable elevation above the earth, when, the atmospheric column being diminished, that of the mercury, which was supposed to be its balance, ought to be shortened likewise in a corresponding proportion. It followed that we had thus, therefore, a measure of the weight of the atmosphere in all circumstances, and consequently of the height of any place to which we could carry the instrument. The experiment was performed, and the result was as Pascal had anticipated. In this way, at length, was completed a discovery, the first steps towards which had been made two thousand years before; during the whole of which period the phenomena best fitted to suggest it were matter of daily observation to every one; but which, nevertheless, at last escaped even several of the greatest philosophers who had made the nearest approach to its development.

"Originally," says an elegant modern writer, "all human knowledge was nothing more than the knowledge of a compara-

tively small number of such simple facts as those from which Galileo deduced the use of the pendulum for the measurement of time, and Newton the explanation of the system of the heavens. All the rest of our knowledge, and these first rudiments of it also, a succession of individuals have gradually discovered in separate portions, by their own efforts, and without having any teacher to instruct them. In other words, every thing that is actually known has been found out and learned by some person or other, without the aid of an instructor. This is the first consideration for all those who aspire, in the present day, to be their own instructors in any branch of science or literature.

"Furnished as society now is, in all its departments, with accommodations in aid of intellectual exertion, such as, in some respects, even the highest station and the greatest wealth in former times could not command, it may be safely asserted, that hardly any unassisted student can have at present difficulties to encounter equal to those which have been a thousand times already triumphantly overcome by others. Above all, books, and especially elementary books, have, in our day, been multiplied to an extent that puts them within the reach almost of the poorest student; and books, after all, are, at least to the more mature understanding, and in regard to such subjects as they are fitted to explain, the best teachers. He who can read, and is possessed of a good elementary treatise on the science he wishes to learn, hardly, in truth, needs a master. With only this assistance, and sometimes with hardly this, some of the greatest scholars and philosophers that ever appeared, have formed themselves. And let him who, smitten by the love of knowledge, may yet conceive himself to be, on any account, unfortunately circumstanced for the business of mental cultivation, bethink him how often the eager student has triumphed over a host of impediments, much more formidable, in all probability, than any by which he is surrounded. Want of leisure, want of instructors, want of books; poverty, ill health, imprisonment, uncongenial or distracting occupations, the force of opposing example, the discouragement of friends or relations, the depressing consideration that the better part of life was already spent and gone,—have all, separately, or in various combinations, exerted their influence either to check the pursuit of knowledge, or to prevent the very desire of it from springing up. But they exerted this influence in vain. Here, then, is enough, both of encouragement and of direction, for all. To the illustrious vanquishers of fortune, we would point as guides for all who, similarly circumstanced, may aspire to follow in the same honourable path. Their lives are lessons that cannot be read without profit; nor are they lessons

for the perusal of one class of society only. All, even those who are seemingly the most happily situated for the cultivation of their minds, may derive a stimulus from such anecdotes. No situation, in truth, is altogether without its unfavourable influences. If there be not poverty to crush, there may be wealth and ease to relax, the spirit. He who is left to educate himself in every thing, may have many difficulties to struggle with ; but he who is saved every struggle, is, perhaps, still more unfortunate. If one mind be in danger of starving for want of books, another may be surfeited by too many. If, again, a laborious occupation leave to some but little time for study, there are temptations, it should be remembered, attendant upon rank and affluence, which are to the full as hard to escape from as any occupation. If, however, there be any one who stands free, or comparatively free, from every kind of impediment to the cultivation of his intellectual faculties, surely he must pursue, with peculiar interest, the account of what the love of knowledge has achieved in circumstances so opposite to his own. Certain, at least, it is, that such achievements produce a most powerful call upon his exertions in the pursuit of science and literature, that his acquisitions may be, in some degree, commensurate to his advantages. Finally, for all who love to read of bold and successful adventure, and to follow daring ambition in its career to greatness, it cannot but be interesting to contemplate the exploits of some of the most enterprising spirits of our race,—the adventurers, namely, of the world of intellect, whose ambition, while it has soared as high, and performed feats as brilliant as any other, never excites in us an interest dangerous to feel, nor holds up to us an example criminal to follow ; because its conquests have been a blessing, and not a curse to humanity." —See *Pursuit of Knowledge under Difficulties*, ch. i.

# CHAPTER II.

## WRITING.

### Section I.—History of Written Language.

This art has been justly considered one of the noblest and most beneficial inventions of which human ingenuity can boast. It has been supposed that the earliest method of communicating ideas without the exercise of speech, was by hieroglyphical characters, such as those which were in use among the ancient Egyptians. The most simple species of hieroglyphics was that in which the delineation of part of the object or action represented the whole; thus the ancient Egyptians painted a man's two feet in water to represent a fuller; smoke ascending, to denote fire; two hands, one of which held a buckler, the other a bow, to denote a battle, &c. Examples of a second class of hieroglyphics, are the eye and the sceptre, to denote a king; a sword, to denote a bloody tyrant; the mouth, for speech and voice; an eye, placed in an eminent position, to denote the presence of God; and the sun and moon, in like manner, were used to denote the succession of time. A third kind of hieroglyphics was that which employed, to represent one thing, another which had some resemblance or analogy to it. For instance, among the Egyptians the dog's head, (as among the Chinese the dog's voice,) was the symbol of sorrow; science was denoted by dew falling from heaven. The very metaphor is expressed in the form of a simile in Deut. xxxii. 2: "My doctrine shall drop as the rain, my speech shall distil as the rain upon the tender herb, as the showers on the grass."

The rudest species of visible communications with which we are acquainted, is that of the Peruvians: it was by means of knotted cords of various colours. We have reason to believe, however, that this was not the only species of visible communication among them; and it was evidently very defective. By various colours different objects were denoted, and by each knot a distinct number; so that they might serve as a kind of register of the number of inhabitants in each province, or of the quota they furnished to the general treasury of the nation. The Mexican picture-writing

was the first step in the progress towards alphabetical writing. The essential difference which it will be desirable to keep in mind between the latter and all the intermediate steps, is, that in alphabetical writing we use signs for sounds only; except with the deaf, they are in the first instance significant of things or ideas only by an intermediate step: picture-writing, in all its various stages, presents signs for things or ideas directly, and only for sounds as being the denotement of them. The Mexicans, when the Spanish invaders first arrived on their coast, sent large paintings on cloth, as expresses to their emperor Montezuma. But the Mexicans had made much greater advances than their savage countrymen; except in some few instances, they did not go further than simple delineation, but by a proper disposition of their figures, they could exhibit a more complex series of events in historical order. They could describe, for instance, the occurrences of a king's reign from his accession to his death; the progress of an infant's education, from its birth to the years of maturity; the different recompenses and marks of distinction conferred upon warriors, in proportion to the exploits they had performed. Some very curious specimens of this picture-writing are preserved; the most valuable one has been published, and may be found in Purchas's Pilgrim. It is divided into three parts. The first contains a history of the Mexican empire under its ten monarchs; the second is a tribute roll, representing what each conquered town paid into the royal treasury; the third is a code of their institutions, domestic, political, and literary.

The first object of those who invented hieroglyphics, was to preserve the memory of events, and to make known laws and regulations for the conduct of the citizen and the man. Such symbols, therefore, would first be employed as were of obvious interpretations. Figures founded on their language would be readily understood, even if the analogies which gave birth to the words were forgotten. By degrees they were employed for the more refined purposes of philosophy; and analogies and resemblances were the foundation of hieroglyphics, which would be intelligible only to those who were acquainted with the sciences from which those analogies were deduced. We see, from the remains of the Egyptian hieroglyphics in their early stages, that they paid considerable attention to the delineation of their figures: they filled up the outline of their pictures; in process of time they used only the outline; and these, again, they changed as the convenience of the writer dictated, till at last it lost every resemblance to the object which it originally represented. The changes that our written characters have undergone, and are con-

tinually undergoing, might be adduced as an exemplification of this procedure, from delineation to the cursive hieroglyphic. The mark for *and*, for example, was originally significant; it did not, indeed, represent an object, but it was a correct picture of a word. Some of the forms yet show its derivation; & is obviously *et*, the Latin word for *and*, but continual changes have been made upon it, till the & of the writer no longer bears marks of its origin.

We have now advanced to the verge of alphabetical writing. As the difference of articulate sounds was intended to express the different ideas of the mind, so one letter was originally intended to signify only one sound, and not, as at present, to express sometimes one sound, and sometimes another; which practice has brought a great deal of confusion into the languages, and rendered the learning of the modern tongues infinitely more difficult than it would otherwise have been. This consideration, together with the poverty of all the known alphabets, and their want of some letters to express certain sounds by, has occasioned several attempts towards an universal alphabet, to contain one enumeration of all such single sounds or letters as are used in any language: a thing of very considerable use, a specimen of which is given us by Mr. Lodwick, in the Philosophical Transactions. This, however, has not come into common use.

In regard to the first letters, it is still difficult to decide what they consisted of, who first invented them, or among what people they were first in use; however, setting aside conjectures and prejudice, the question of antiquity seems to lie between the Egyptians and Chinese. The Egyptian mummies and obelisks prove great antiquity on the side of their hieroglyphics; but if the Chinese chronology may be credited, their characters are much more ancient than those of the Egyptians. The Chinese consider Fohi, the first of their kings, (supposed by many learned and judicious writers to have been the patriarch Noah,) the inventor of their letters; and compute that he lived two thousand nine hundred and fifty years before Christ, during all which time they pretend to have certain and written accounts in their books. If this be true, their character must be older than Moses by fourteen hundred years, and even prior to Menes, the first king of Egypt, by five hundred years; so that the Chinese letters appear to be the most ancient of that kind; and the book Yekim, said to be written by Fohi, the most ancient book. But as China is so remote, and had so little communication with these parts of the world, we may reasonably institute another inquiry into the origin of letters in Asia Minor, Egypt, and Europe. Here, indeed, the Egyptians seem to have the best title. It is more than probable, from the obelisks,

&c. that their hieroglyphics were the first manner of writing, and the original characters in these parts, as being prior to Moses; and that they were made, at least in great measure, while the Israelites were slaves among them, and consequently not well qualified for inventions so very curious and judicious.

To this source the learned bishop Warburton ascribes the origin of alphabetical writing among the Egyptians: for as philosophy advanced, and their learned men wrote much, the exact delineation of hieroglyphic figures became too tedious and too voluminous; and they, therefore, by degrees perfected another character, which he calls the running hand of hieroglyphics, resembling the Chinese characters, which being at first formed only by the outlines of each figure, became at length a kind of marks. This running character was denominated by the ancients hieroglyphical, and led to the compendious use of letters by an alphabet, which method of writing, as the ancients inform us, was invented by the secretary of an Egyptian king, and first used for secrecy in the conveyance of letters of state, whence it was called epistolary writing; but afterwards letters became common, and, as he observes, hieroglyphics secret and mysterious. This political alphabet, he adds, soon occasioned the invention of a sacred one, used by the priests, and called hierogrammatical. But the precise time of the invention of Egyptian letters cannot be so much as guessed at, because hieroglyphics continued in use long after letters had been found out; it is certain that they were very early, because the invention of them was ascribed to their gods. Bishop Warburton further conjectures, that Moses brought letters with the rest of his learning from Egypt, and that he both enlarged the alphabet, because the Hebrew alphabet which he employed in the composition of the Pentateuch is considerably fuller than that which Cadmus brought into Greece; and altered the shapes of the letters, reducing them into something like those simple forms in which we now find them, in order to prevent the abuse to which they would be liable as hieroglyphic marks and symbolic images.

Previous to the invention of paper, various were the materials on which mankind, in different ages and countries, had contrived to write their sentiments; as on stones, bricks, the leaves of herbs and trees, and their rinds and barks; also on tables of wood, wax, and ivory; to which may be added, plates of lead, linen rolls, &c. At length the Egyptian papyrus was invented; then parchment; then cotton paper; and lastly, the common, or linen paper. In some places and ages they have even written on the skins of fishes; in others, on the intestines of serpents; and in others, on

the backs of tortoises. In Ceylon they write on the leaves of the talipot; and the Brahmin manuscripts in the Tulinga language, sent to Oxford from Fort St. George, are written on leaves of the ampana, or Palma Malabarica. In the Maldive islands, the natives are said to write on the leaves of a tree called macaraquean, which are a fathom and a half long, and about a foot broad; and in various parts of the East Indies, the leaves of the musa, or bor, or plantain tree, dried in the sun, served for the same use, till of late the French have taught them the use of European paper.

The Egyptian papyrus, which was the material chiefly used by the ancients, was made of a kind of reed, called papyrus, growing in Egypt, on the banks of the Nile. According to Isidorus, this paper was first used at Memphis; it is not certain at what particular period, but there are several authorities which prove the use of it in Egypt long before the time of Alexander the Great. According to Pliny, they divided, with a kind of needle, the stem of the papyrus into thin plates, or slender pellicles, each of them as large as the plant would admit. These were the elements of which the sheets of paper were composed. As they were separated from the reed, they were extended on a table, and laid across each other, at right angles. In this state they were moistened by the water of the Nile, and whilst wet, were put under a press, and afterwards exposed to the rays of the sun. It was supposed that the water of the Nile had a gummy quality, necessary to glue these stripes together; but Mr. Bruce is of opinion that no such quality is found in the water, and that the saccharine quality, with which the whole juice of this plant is impregnated, is the matter that causes the adhesion of these stripes together, the use of the water being only to dissolve this, and put it perfectly and equally in fusion.

The size of this paper varied much; it seldom exceeded two feet, but it was often smaller. It had different names, according to its size and quality. The first was called imperial, which was the finest and largest kind, and was used for writing letters by the great men among the Romans. The second sort was called by the Romans the Livian paper, from Livia, the wife of Augustus; each leaf of this kind was twelve inches. The third sort was called the sacerdotal paper, and was eleven inches in size. The paper used in the amphitheatres was of the dimensions of nine inches; but what was esteemed of greatest value in it, was its strength, whiteness, and polish. Some manuscripts of this paper still remain, which have, undoubtedly, been written 1000 or 1200 years ago. The papyrus was an important branch of commerce to the Egyptians, which continued to increase towards

the end of the Roman republic, and became still more extensive in the reign of Augustus. It is probable that it continued in use after the sixth century, when it was gradually superseded by the charta bombycina, or paper made from cotton. This paper is incomparably more lasting, and better calculated for all the purposes of writing. It is not precisely known at what period this art, which supposes a great variety of previous experiments, was first reduced to practice; but it is supposed to have been towards the end of the ninth, or beginning of the tenth century.

The art of making paper from vegetables reduced to pulp, somewhat analogous to the modern mode, was known in China long before it was practised in Europe; and the Chinese have carried it to great perfection. The fine paper in China is softer and smoother than most of that of Europe; and these qualities are admirably adapted to the pencil, which the Chinese use in writing. The modern paper, now manufactured throughout Europe, of linen rags, was utterly unknown to the ancients. The precise time of this discovery in Europe is not exactly known. Father Mabillon believes that it was in the twelfth century; but it does not appear to have been in general use till about the beginning of the fourteenth century. The first paper-mill in England was established at Dartford, by a German, jeweller to Queen Elizabeth, about the year 1588. For a long time after its establishment, the manufacture was in a very backward state in this country, so that the finer kinds used to be imported from France and Holland, till within the last seventy or eighty years. From that period, however, the manufacturers of Britain have made rapid strides, and we now find that paper of the best quality is not only made in Kent, the original seat of the manufacture, but in almost every district of the island.

The ancient order of writing was from right to left; and this method prevailed even among the Greeks. They used, afterwards, to write alternately from right to left, and from left to right; this continued to the time of Solon, the famous Athenian legislator. However, the motion from the left to the right being found more natural and convenient, this method has been adopted by all the European nations.

## Section II.—Instructions in Writing.

The art of writing being altogether imitative, is purely mechanical; it may, therefore, be said with truth, that every young person may, by proper attention, learn to write with regularity and elegance, with accuracy and speed. He has only to follow the counsels of a

judicious teacher, and to copy, with assiduity, the most correct specimens and examples he can procure, to become a proficient in penmanship. In the beginning the learner ought to practise the formation of his letters of a very large size; for in large characters, errors more readily strike the eye, and may, consequently, be more easily corrected, than in small writing. In writing on a large scale, the proportions of the several parts of a letter amongst themselves, and of the broad and fine strokes of which these parts consist, are the most accurately and easily attended to; and he who is expert in forming a large character, will, with great facility, descend to the formation of others of a middling or small size. The young penman ought also to lay it down as a law to draw every stroke, and form every letter, with the greatest deliberation. It has, within these few centuries, become the practice in Europe to shape the letters not perpendicular to the line, as in Roman print, but inclined from the right above to the left below. This practice first sprung up in Italy, whither literature, science, and the arts fled for protection, when, in the fifteenth century, Greece and Western Asia were overwhelmed by Mahometan superstition and barbarism; and from whence the cheering light of knowledge spread over the other nations of Europe. In France, Spain, and Italy, the letters stand much more erect upon the line than they do with us; yet we have never ascertained the degree of inclination of our written characters. Much, therefore, must in this case be left to the judgment and taste of the writer. Having adopted a proper degree of inclination, letters must all have precisely the same slope; that is, all the down-strokes must be drawn perfectly parallel to each other, or at equal distances asunder, in their whole length. Letters of the same kind must also be made of exactly equal lengths, whether, as *i* and *n* in round text, they be confined within the lines limiting the body of the writing, or as *b* and *h*, they rise above the upper line, or as *p* and *y*, they fall below the under line. It seems advisable that long letters, such as *d* and *g*, should just rise above the upper line, and fall below the under line, bounding the body of the writing, as much as is equal to the space between these bounding lines. Whatever indulgence may be granted to the writer in the size of the first capital beginning a letter, a poem, a discourse, &c., all the other capitals in the body of the work ought to be strictly confined to rise no higher above the body of the writing than *b* or *k*, or any other long small letters.

All characters in writing are formed by means of two motions of the pen; the one upwards, fine and delicate, and therefore called a hair-stroke; the other downwards, broad and strong, called

a down-stroke. The proportion between those strokes never has been, and, perhaps, never can be, determined. Still, that some sort of proportion ought to be preserved, will be evident to any one who examines letters written, engraved, printed, carved, or painted, in which the proper balance is not maintained. It is likewise to be observed, that in passing from the hair to the broad stroke, the change must be so gradual and regular, that it may be, in some measure, impossible to say where the former ends, and the latter begins. It is a great fault in writing, as in engraving and printing, that the hair-stroke is made so extremely delicate, that when beheld at a proper distance, the letters seem to consist only of an endless succession of dark lines, at certain intervals, apparently unconnected; because the fine strokes, by which they are, in fact, joined together, are so over-fine, as then to be imperceptible. Having proceeded thus far in explanation of the rules for writing a fair hand, in this country, it is now necessary only to refer the student to the engraved examples or copies to be found in all respectable stationers' shops.

Nothing tends more to the acquisition of a good manner of writing than a proper mode of holding the pen, and an attitude of the hand, arm, and whole body, at once natural, easy, and graceful. If a writer suffer himself, or be suffered by his instructor, to contract a stiff, constrained, or awkward manner, in the management of his pen, or the position of his body at the desk, his operations will be as irksome, and even painful, to himself, as they must be ludicrous and disgusting in the eyes of by-standers. In this, as in every human action in which the influence of habit is of importance, we are constantly to remember the old counsel, —to choose and practise what is the best, and custom will make it the most agreeable. The proper attitudes and motions of the body in writing can be learned much more speedily, and much more effectually, from the instructions and example of a skilful teacher, than from whole volumes on the subject. The pen should be held in the right hand, between the thumb and the fore and middle fingers. The middle finger partly on the side, and partly on the back, opposite to the head of the cut or cradle of the pen, and the fore finger close to it, on the back; both quite straight. The thumb should support the other side of the pen, and be a little bent, in order to give it an easy motion. The fourth finger should be turned in towards the palm; and the little finger, stretched out even with those holding the pen, should rest upon the paper, to support the hand. The elbow should be kept so near the body as to allow its motion to be easy and unconstrained, neither stiffly touching the side, nor ridiculously sprawling over the table. In this

position, the pen will be held in a direction pointing to the right shoulder. The arm may rest lightly on the table or desk, between the elbow and the wrist: but the breast should never touch either. The pen must be held just so firmly as to keep its proper place, for if it be griped hard, the learner will never acquire ease and expedition in writing.

## Section III.—Pens and ink.

If it be difficult to give precise and intelligible directions for placing the body and managing the pen in writing, it is still much more difficult to instruct the beginner how to turn a quill into a pen, or how to repair his pen when disordered by use. In this a few practical lessons from a skilful maker and mender will be of more service than any verbal instructions: the following general observations will, nevertheless, be of service. With the back of the pen-knife scrape the thin scurf from a goose-quill, particularly on the back, that the slit may be sound and clean. Then cut the quill half through, near the point, on the back, and quite through on the opposite side, half an inch from the point. With the edge of the knife, make a very short slit in the back notch, and with the end of the knife-haft, or another whole quill, by a quick pressure upwards, open the slit to a proper length, which will be fixed by pressing hard on the back of the quill, with the nail of the left thumb. By several applications of the knife, the quill is brought into the proper shape of a pen, ending in a fine point, which must be made even, or nibbed, in this way:—Place the knife upon the nib, and cut it through, by a change of position from a slope to right across; and then by other cuts give the finishing strokes to the pen. It is to be remembered that if, upon trial, the slit or the nib do not answer, it ought not to be scraped; for that always makes it rough or ragged. When the nib, therefore, requires alteration, it is to be mended by nibbing, just as when first made. The breadth of the nib, and the length of the slit, are regulated by the breadth and the strength of the black down strokes intended to be written. The learner should accustom himself, in writing, to bear as lightly as possible on his pen. By this method he will be able at all times to draw not only a fine hair stroke, but a stroke of any particular breadth and strength that may be required.

Metal Pens.—As the introduction of metal pens, of various constructions, has now become very common, it seems needful in this place to say a few words respecting them. The chief advantage derived from the introduction of these pens, is the saving

of time both in regard to making and mending them, and to those who are well practised in the mode of using them, they have been found in this respect of the most essential service. When first introduced, metal pens were manufactured chiefly of steel, and were found not to answer, partly from the brittleness of the metal, and partly from the corrosive effect of the ink upon them. Latterly, however, compound metals of various kinds have been introduced, by which both these evils have been in great measure avoided. Great improvements have also been made in their construction, so as more effectually to imitate the pens made from quills. Of the metal pens now in use of an improved manufacture, those made by Rudhall and Co. Birmingham, are among the best. Many persons on a first trial of metal pens have too hastily discarded them, when by a little care in their first introduction, the inconveniences might be all remedied, and the advantage above alluded to, of saving of time, secured. Few rules for their use can be given beyond those obtained from experience, but the following may be of service. 1. To see the ink be always clear, and somewhat more liquid than that used for quill pens. 2. To be careful to bear equally on both nibs. And lastly, always to clean them carefully from ink after using them, or the best metal pens will soon be destroyed.

Writing Ink.—Various receipts have been given for composing writing ink: but few are founded on a knowledge of the chemical or other properties of the several ingredients recommended, and of the changes which a course of time and exposure to the air may produce. The following receipt is given in the lectures of that great chemist, the late Professor Black, of Edinburgh. Take in the given proportions, of rasped log-wood 1 ounce; of best gall nuts in coarse powder 3 ounces; of gum-arabic in powder 2 ounces; of green vitriol 1 ounce; of rain-water 2 quarts; of cloves in coarse powder 1 drachm. Boil the water, with the log-wood and gum, down to one half; strain the hot decoction into a glazed vessel; add the galls and cloves; mix the whole well, and cover it up. When nearly cold, add the green vitriol, and stir the infusion repeatedly. After some days, decant or strain the ink into a bottle, to be kept close corked, in a dark place.

The following receipt is given by an eminent chemist in France, where, of late years, the beauty and durability of writing ink have become objects of careful and scientific inquiry. Take of Aleppo galls in coarse powder 8 ounces; of log-wood in thin chips 4 ounces; of green copperas 4 ounces; of gum-arabic in powder 3 ounces; of blue vitriol 1 ounce; of sugar-candy 1 ounce.

Boil the log-wood and galls together in 12 pounds of water, for one hour, or till the liquid be evaporated. Strain the decoction through a hair sieve or linen cloth, and then add the other ingredients, stir the mixture till the whole be dissolved, particularly the gum; after which leave it to subside for twenty-four hours. Then decant the ink, and preserve it in bottles of glass or stone-ware well corked. Ink is often of a pale colour when first used, but it grows black when exposed to the air. This is owing to its uniting with the oxygen, the principle of acidity, and one of the component principles of our atmosphere: for the iron in the green vitriol not being saturated with oxygen, it absorbs still more from the air, and is then converted into red oxyde, or what we call rust.

*Red Ink* is usually made as follows:—Take of the raspings of Brazil-wood a quarter of a pound, and infuse them for two or three days in vinegar; boil the infusion afterwards for an hour, over a gentle fire, and filter it while hot. Set it again on the fire, and dissolve in it, first, half an ounce of gum-arabic, and afterwards, of alum and white sugar, each half an ounce.

*Printing Ink* is in fact a black paint, composed of lamp-black and linseed or sweet oil, boiled so as to acquire considerable consistence and tenacity. The art of preparing this ink is kept a secret; but the obtaining of proper lamp-black seems to be the principal requisite in its composition.

*Copper-plate printers* use an ink different from the above, in the oil not being so much boiled, and that Frankfort black is used for lamp-black.

Besides the foregoing kinds of ink, of indispensable use in the affairs of life, others are sometimes employed for secret writing, generally for amusement, but which may, on particular occasions, be really useful. Thus, for instance, the infusion of galls and a solution of green vitroil, will produce a black colour; if, therefore, you write with one of the liquids, and then apply the other to it, the black colour will be produced, just as if the ingredients had been mingled before they were applied to the paper.

Other changes of the colours of substances are produced, by exposure to the air and the fire, agreeably to the nature of chemical combinations.—Write with an infusion of gall nuts, and when you wish the writing to appear, dip it in a solution of green vitriol, or, as it is commonly called, copperas, when the writing will become black.—Dissolve some sugar of lead (white lead dissolved in vinegar and evaporated) in water, and write with the liquor. When dry no writing will be visible. To make it appear, wet the paper with a solution of liver of sulphur, (sulphur and potash

mixed together,) and the characters will appear immediately of a brown colour. It will be enough only to expose the writing to the vapour of this solution.—Write with a solution of gold in aqua-regia, (nitro-muriatic acid,) a compound of aqua fortis and spirits of sea-salt, and let the paper dry slowly in the shade. In this state, no writing will be seen; but if a sponge be drawn over it, containing tin dissolved in aqua regia, the letters will immediately appear of a purple colour.

Another mode of secret writing has often been employed in conveying intelligence from ambassadors and ministers in foreign parts, to their own courts. This is by the means of ciphers, or marks previously agreed upon, between the parties in the correspondence, to whom alone their import is known. In the early times of Greece, we are told that the Lacedæmonians corresponded with their generals in the field, by means of a very simple, though secret contrivance. The magistrates caused to be provided two pieces of wood, perfectly round, and of precisely the same thickness, about six feet long. One of the batons was given to the general, and the other remained with the magistrates. When a communication was to be made between the parties, a long piece of parchment was rolled in a spiral or screw form, from one end of the roller to the other; and upon it the information or orders were written, running across the folds of the parchment, which was then taken off the roller and sent to the other party, who applying it accurately to his own roller, was able to read the communication, which to those who were ignorant of the size of the roller would be totally unintelligible.

As the writing in cipher is become an art of importance, the counterpart is still more so, namely, the art of deciphering, or reading secret characters. As the characters, or marks, chosen at pleasure by the parties who employ the cipher, seem to be entirely arbitrary, it would appear impossible to discover their meaning by the most careful examination; but as in all languages, certain letters, syllables, and words, occur much oftener than others, if the language in which the cipher is written can be discovered, a man much practised in writing or reading one kind of cipher will be able to penetrate the meaning of almost any other that can be employed. No man, perhaps, attained to a greater proficiency in the art of deciphering than the celebrated geometrician, Dr. Wallis. So skilful and expert had he become, as to be able to write out the words of papers written in cipher, and in a language with which he was totally unacquainted. Having written out the words, the language was soon known, and the secret contents unfolded.

## Section IV.—Short Hand.

This species of writing, often called stenography, was known and practised by most of the ancient civilized nations. After the introduction of the Egyptian hieroglyphics, which occupied a considerable space, a more concise mode of writing seems to have been introduced, in which only a part of the symbol or picture was drawn. From them the Hebrews, the Greeks, and the Romans, adopted different methods of abbreviating their words and sentences, suited to their respective languages. The initials, the finals, or radicals, often served for whole words; and various combinations of these sometimes formed a sentence. Arbitrary marks were likewise employed to determine their meaning, and to assist legibility; and it seems probable that every writer, and every author of antiquity, had some peculiar method of abbreviation, calculated to facilitate the expression of his own sentiments, and intelligible only to himself. In every language of Europe, till about the close of the sixteenth century, the Roman plan of abbreviating, (viz. substituting the initials or radicals, with the help of arbitraries, for words) appears to have been employed. Hitherto, no regular alphabet had been invented expressly for stenography, when about that period an English gentleman of the name of Willis, invented and published one. His plan was soon altered and improved, and at intervals, for a series of years past, some men of ingenuity and application have composed and published systems of stenography; but among the various methods that have been proposed, and the different plans that have been adopted by individuals, none have yet appeared sufficiently simple and efficient to gain universal approbation.

The ingenious system of Gurney, practised and published sixty years ago, but much improved by his descendants of the present day, is esteemed to be among the most rational. Still this system, with all its excellences, is not devoid of certain defects, inseparable from the employment of marks, signs, and characters, founded not so much upon philosophical principles, as upon the voluntary and arbitrary taste and choice of the founder. A near approach to a character, conveying to the eye of readers of all countries a distinct notion of its meaning, although on a very limited scale, has been made on the marks and signs adopted in the modern system of chemistry. Every simple substance has there its peculiar representative sign; and the compounds of various substances are denoted by a complex sign, made up of the simple signs, representing each component ingredient. It is said that a nearer approach to an universal character, intelligible and practicable by men of all

nations, has for many years been preparing for the public eye, in this country; in which grammatical accuracy, simplicity, and distinctness, are most ingeniously combined with inconceivable facility and rapidity of execution. By the use of a dot, or other simple mark, applied in a particular way, the several parts of speech, the voices, moods, and tenses of verbs, &c., can be expressed upon paper, with sufficient speed to enable a writer, acquainted with the system, to keep pace with any public speaker whatever. According to the modes of short-hand hitherto used, few men have ever been able to take accurately down every word that fell from the speaker's lips; and those few who, by dint of long and incessant practice, have attained so desirable a proficiency in their art, have employed a multitude of arbitrary marks drawn from their own fancy, with which by constant use they became familiar. Of the meaning of many of those marks, all others but the inventor being generally ignorant, it has often happened that, at the decease of the writer, his contractions and signs have remained quite unintelligible. Of this a remarkable instance occurred some time ago in Scotland, where a celebrated mathematician, intending in his old age to publish the geometrical lucubrations of his younger days, drawn up in a short-hand of his own invention, (but which he had long disused,) was constrained to abandon the project, to his mortification and the public loss, being utterly unable to read his own contractions and marks, and no longer in a condition to resume the course of studies necessary to reproduce the work.

## Section V.—The Telegraph.

This invention may with great propriety be noticed in this place, as one of the methods by which intelligence can be communicated to the mind, by means of the eye, and that at a great distance. There is reason to believe, that amongst the Greeks there was some sort of telegraph in use. The Chinese, when they send couriers on the great canal, or when any great man travels there, make signals by fire from one day's journey to another, to have every thing prepared; and most of the barbarous nations used formerly to give the alarm of war by fires lighted on the hills or rising grounds. In the year 1663, the Marquess of Worcester, in his Century of Inventions, affirmed that he had discovered "a method by which at a window, as far as my eye can discover black from white, a man may hold discourse with his correspondent, without noise made or notice taken; being, according to occasion given, or means afforded, *ex re nata*, and no need of provision

beforehand; though much better if foreseen, and course taken by mutual consent of parties." About forty years afterwards, in France, M. Amontons proposed a new telegraph. His method was this. Let there be people placed in several stations, at a certain distance from one another, that by the help of a telescope a man in one station may see a signal made in the next before him; he must immediately make the same signal, that it may be seen by persons in the next after him, who are to communicate it to those in the following station, &c. It was not, however, till the French revolution, that the telegraph was applied generally to useful purposes. Whether M. Chappe, who is said to have invented the telegraph first used by the French, about the end of 1793, knew any thing of Amontons's invention or not, it is impossible to say; but his telegraph was constructed on principles nearly similar. Since this time, various kinds of telegraphs have been used in France, and other countries on the continent: but that adopted in this kingdom differs in outward form from them all. The following is its general principle, subject, however, to modifications, according to circumstances:—

A long wooden frame, like the case of a large door or window, is divided from top to bottom by another strong piece of timber, parting the frame as it were into two leaves of a door. Each of these is divided into three parts by small shutters, movable upon hinges placed in the uprights, so as to be fixed in any position, perpendicular or horizontal, by means of wires and springs communicating with the room below the machine, where are placed the managers of the telegraph. When any communication is to be made, all the six shutters are drawn up perpendicularly, so as to fill the whole frame. When the telegraph next in course to the first has given sign of being prepared, by likewise closing up the frame, the manager of the first begins by opening all the shutters but those which, by previous agreement, are to express certan words or sentences, and the second telegraph repeats the same motions of the shutters, which are immediately repeated by the third in the chain, and so on to the extremity, where the communication is to be finally made. By this contrivance, news or orders may be conveyed through a long chain of telegraphs, without the slightest chance of their being known to any persons but to those at the beginning and the end: for the intermediate stations have only to imitate the operations of the first. The number of shutters in the telegraph being only six, it may perhaps be perceived that but few variations of intelligence can be conveyed by that number; it is, however, a matter of positive calculation, that by these, every thing that can be necessary to

communicate in that rapid way, may be certainly expressed. If the bells in a steeple be four, the changes that may be rung upon them are 24: but if six, the changes will amount to no fewer than 720. This calculation is not, however, wholly applicable to the telegraph; because it is not enough that six words can change places many times, for they must also be so arranged as to form some sense. By this the combinations are exceedingly restricted; besides that, the great variety of matter on which it may be necessary to make communications, must require various sets and classes of terms, to be used as occasions shall present themselves. By means of lights suspended in certain positions, intelligence may be conveyed in the night-time, as well as by the common telegraph in the day.

## Section VI.—Superscriptions and Addresses for Letters, &c.

### ROYAL FAMILY.

To the King's Most Excellent Majesty.—*Sire;* or, *May it please your Majesty.*

To the Queen's Most Excellent Majesty.—*Madam;* or, *May it please your Majesty.*

To His Royal Highness the Duke of Sussex.—*May it please your Royal Highness.*

And in like manner to any other of the Royal Family, varying only the title and sex.

### NOBILITY.

To His Grace the Duke of A.—*My Lord Duke; Your Grace.*

To the Most Hon. the Marquess of A.—*My Lord Marquess; Your Lordship.*

Marquesses have been very generally, for some time past, styled Most Noble; but this is incorrect, and the Garter King at Arms invariably styles them Most Honourable. When the title is taken from the name of a place, as Winchester, Shrewsbury, &c. we say the Marquess of Winchester, the Earl of Shrewsbury; if from the name of a family, as Wellesley, Spencer, &c. the word "of" is omitted, and we say the Marquess Wellesley; the Earl Spencer.

To the Right Hon. the Earl of A. To the Right Hon. Lord Viscount B. To the Right Hon. Lord C.—*My Lord; Your Lordship.*

It has been customary of late to omit the titles of Most Honourable, Right Honourable, &c., and merely to write,—To

the Marquess of Lansdowne, or To the Earl of Cardigan; but the former style is the most respectful.

The ladies of Noblemen are addressed in terms according to the rank of their husbands. The title of Lord and Right. Hon. is given, by courtesy, to all the sons of Dukes and Marquesses; and the title of Lady to all their daughters.

### GENTRY.

To the Hon. Sir A. B., Bart. at C., near D.
To the Hon. Sir A. B., Knight, at C., in Suffolk.
To A. B., Esq. at M., in Cheshire.

The wives of Knights and Baronets are called Lady A., or Lady B.; but the wives of Esquires, and other Gentlemen, only Mistress A., &c.; except they have a title previously to their marriage, which they commonly retain.

Every considerable servant to the King, on the Civil or Military List, or to any of the Royal Family, is styled Esquire. As this title is now given also to every man of respectability, the only distinction to be made in favour of persons who are considered as entitled to superior consideration, is the addition of, &c. &c. &c. to the superscription.

It is also deemed more respectful to write the word Esquire in full length, as, To G. G. Harcourt, Esquire, &c. &c. &c.

The persons legally entitled to the rank of Esquire are the eldest sons of Knights, and their eldest sons in perpetual succession; the eldest sons of the younger sons of Peers, and their eldest sons, in like succession; Esquires by virtue of their office, as Justices of the Peace; and Esquires of Knights of the Bath, each of whom constitutes three at his installation; to these may be added all those who are styled Esquires by the King in their commissions and appointments; all, indeed, who are in any way once honoured by the King with the title have a right to that distinction for life: thus Captains in the Army are Esquires, because they happened to be so styled in their commission, which is signed by the King; but Captains in the Navy, though of higher military rank, are not entitled to this distinction, their commissions being signed by the Lords of the Admiralty.

Barristers have long assumed this title, and Mr. Christian, in his Notes to Blackstone, relates a ridiculous anecdote of a judge refusing to receive an affidavit, in which a Barrister was named without the title; but their claim to this distinction is unfounded.

PARLIAMENT.

To the Right Honourable the Lords Spiritual and Temporal of the United Kingdom of Great Britain and Ireland, in Parliament assembled.

To the Honourable the Commons of the United Kingdom of Great Britain and Ireland, in Parliament assembled.

THE CHURCH.

To His Grace the Lord Archbishop of Canterbury.—*My Lord Archbishop.*

The style of address to the Archbishop of Armagh is,—To His Grace the Lord Primate of Ireland. That of the other Irish Archbishops is similar to the English.

The clerical style of all Archbishops is, Most Reverend; but the above mode of address is that generally used, even by the clergy.

To the Right Reverend the Lord Bishop of Chichester.—*My Lord Bishop.*

It has been customary, of late, to omit the title of Right Reverend, and merely to write, To the Lord Bishop of Chichester; but the former style is the most respectful.

The Bishops of Sodor and Man, Quebec, Nova Scotia, Calcutta, Madras, Bombay, Jamaica, and Barbadoes, are addressed in the same manner as those of England.

Bishops of the Episcopalian Church in Scotland, and in the United States of America, are addressed by name, without the title of Lord.—To the Rev. Edmund Cartwright, D.D.; or, To the Rev. Dr. Cartwright.

There are many cases where clergymen, having taken the degree of Doctor of Laws, assume the designation of Reverend Doctor,—a title properly belonging to Doctors of Divinity alone. The superscription should be thus:—To the Rev. James Stainer Clarke, D.C.L.

Doctors, not being clergymen, whether of Law, Medicine, or Music, usually have the title prefixed to their name, as Dr. Phillimore, Dr. Ashburner, or Dr. Bushy; but the following is the most correct:—To Joseph Phillimore, Esq., LL.D. To John Ashburner, Esq., M.D. To —— Bushy, Esq., M.D.

To the Very Reverend the Dean of Canterbury.—*Mr. Dean;* or, *Reverend Sir.*

To the Venerable the Archdeacon Bathurst.—*Mr. Archdeacon*; or, *Reverend Sir*

If a Bishop, or other clergyman, possess the title of Right Honourable, or Honourable, it is prefixed to his clerical title.

### OFFICERS OF THE ROYAL HOUSEHOLD.

These are generally addressed according to their rank and quality; but sometimes according to their office,—as, My Lord Steward; My Lord Chamberlain; Mr. Comptroller; Mr. Vice-Chamberlain.

In superscriptions of letters that relate to gentlemen's employments, their style of office ought never to be omitted.

### OFFICERS OF THE CIVIL LIST.

To Her Majesty's Secretary of State for the Foreign Department.
To Her Majesty's Principal Secretary of State for the Home Department.
To the Lords Commissioners of Her Majesty's Treasury.
To the Lords Commissioners of the Admiralty.
To the Principal Officers of Her Majesty's Ordnance.
To the Commissioners of Her Majesty's Customs.
To the Commissioners of Her Majesty's Revenue of Excise, &c.

### THE ARMY.

To the Hon. A. B., Esq., Lieutenant-General: Major-General: Brigadier-General of Her Majesty's Forces.
To the Right Hon. A., Earl of B., Captain of Her Majesty's First Troop of Horse Guards.
To the Hon. Colonel A. B. To Major A. To Captain A., &c.
To the Principal Officers of Her Majesty's Ordnance.

### THE NAVY.

To His Grace A., Duke of B., Lord High Admiral of Great Britain.
To the Right Hon. A.,—Lord Viscount B.,—Vice, or Rear-Admiral of Great Britain.
To the Right Hon. Sir A. B., Admiral of the Blue: Vice-Admiral of the Red: Rear-Admiral of the White.
To Captain A. B., Commander of Her Majesty's Ship the Liberty, riding at Spithead, &c.

### AMBASSADORS.

English, as well as Foreign Ambassadors, merely have Excellency prefixed to their other titles, with the addition of their accredited rank.

Austria.—To His Excellency the Right Hon. Sir Frederick Lamb, G.C.B., H.B.M. Ambassador Extraordinary and Plenipotentiary at the Court of Vienna.

Russia.—To His Excellency the Right Hon. Sir Stratford Canning, H B.M. Ambassador Extraordinary and Plenipotentiary at the Court of St. Petersburg.

France.—To His Excellency the Right Hon. the Earl Granville, G.C.B., H.B.M. Ambassador Extraordinary and Plenipotentiary to His Most Christian Majesty.

Spain.—To G. W. T. Villiers, Esq., Envoy Extraordinary and Minister Plenipotentiary to Her Catholic Majesty.

Holland.—To His Excellency the Right Hon. Sir Charles Bagot, G.C.B., H.B.M. Ambassador Extraordinary and Plenipotentiary to His Majesty the King of Holland.

Persia.—To Sir J. N. R. Campbell, H.B.M. Chargé d'Affaires to His Majesty the King of Persia.

America.—To the Right Hon. Sir Charles R. Vaughan, H.B.M. Envoy Extraordinary and Minister Plenipotentiary to the United States of America.

### THE LAW.

To the Right Hon. the Lord High Chancellor.
To the Right Hon. the Lord Chief Justice of the Court of Queen's Bench.
To the Right Hon. the Lord Chief Justice of the Court of Common Pleas.
To His Honour the Master of the Rolls.
To His Honour the Vice-Chancellor.
To the Right Hon. the Lord Chief Baron of the Court of Exchequer.
To the Hon. Mr. Baron Williams.
To Mr. Serjeant Onslow, M.P.

### LIEUTENANCY AND MAGISTRACY.

To the Right Hon. A., Earl of B., Lord Lieutenant and Custos Rotulorum of the County of M.

To A. B., Esq., High Sheriff of the County of M.
To the Right Hon. Sir A. B., Knight, Lord Mayor of the City of London.
To the Right Worshipful Sir A. B., Recorder of the City of London.
To the Right Worshipful A. B., Esq., Alderman of Tower Ward, London.
To the Worshipful A. B., Esq., Mayor of L.

### GOVERNORS UNDER THE CROWN, ETC.

To His Excellency A.,—Lord B.,—Lord Lieutenant of the Kingdom of Ireland.—*Your Excellency.*
To their Excellencies the Lords Justices of the Kingdom of Ireland.—*Your Excellencies.*
To the Right Hon. A., Earl of B., Governor of Dover Castle, and Lord Warden of the Cinque Ports.—*My Lord. Your Lordship.*
To the Right Hon. Lord Viscount B., Constable of the Tower.

The second Governors of Colonies appointed by the King, are styled Lieutenant-Governors; those appointed by Proprietors, as the East India Company, &c. are called Deputy-Governors.

### INCORPORATE BODIES.

To the Hon. the Court of Directors of the United Company of Merchants of England, trading to the East Indies.
To the Hon. the Sub-Governor, Deputy-Governor, and Directors of the South-Sea Company.
To the Hon. the Governor, Deputy-Governor, and Directors of the Bank of England.
To the Masters and Wardens of the Worshipful Company of Drapers.

### MEN OF TRADE AND PROFESSIONS.

To Mr. A. B., Merchant, Broad-street, London.
To Dr. W. C., Hanover-square, London.
To Mr. H. J., Surgeon, Broad-street, London.
To Mr. L. O., Pewterer, Whitechapel, London.
To Mr. P. A., Rope Maker, Wapping, near London.

# CHAPTER III.

## GRAMMAR.

GRAMMAR has been very properly defined, the art of writing and speaking any language with propriety. It has been divided into two parts—general or universal grammar, which, discussing the subject in a philosophical manner, unfolds the origin and nature of language in general; and particular grammar, which treats of the rules of any particular languages.

### SECTION I.—GENERAL OR UNIVERSAL GRAMMAR.

THIS part of grammar, if fully discussed, would lead us too far into abstruse and philosophical inquiries, to comport with the nature and object of the present work; we shall, therefore, be content with a few brief observations. General or universal grammar leads us first to advert to the origin of language. This is a subject which has employed much learned investigation, and on which a great diversity of opinion still exists. Language being the leading instrument by which men communicate their thoughts to one another, it is to this we undoubtedly owe the most important improvements of which our intellectual character is susceptible. Man is endowed not merely with sensations, but with the faculty of reasoning; and simple inarticulate sounds being insufficient for expressing all the various modifications of thought, or for distinguishing between the different sensations of pain or of pleasure, articulation, by which those simple sounds are modified, and a particular meaning fixed to each modification, is absolutely necessary to man. By means of it formed into language, he communicates, with facility, all that diversity of ideas with which his mind is stored. Sounds, when thus modified, are called words; and as words have confessedly no natural relation to the ideas of which they are significant, the use of them must either have been the result of human sagacity, or have been suggested to the first man by the Author of his being. Whether language be of divine or human origin, is a question it is unnecessary here to discuss: upon either supposition the first language must have been extremely vague and limited. If it was of human contrivance, this will be readily granted; for what art was ever invented,

and brought to a state of perfection, by man in an untutored state? If it was taught by God, we cannot suppose that it would be more comprehensive than the ideas of those for whose immediate use it was intended.

The parts of speech, viewed in reference not to any particular language, but to grammar in general, have been variously enumerated, not only as to their number, but in their general arrangement. In some instances, these distinctions are readily decided by the character of the different languages. The Latin, for instance, has no word exactly corresponding to the article ὁ, ἡ, το, in the Greek, and *the*, in English. Those, therefore, who consider these words as the only definite articles in these two languages, will consider the Latin language as possessing no such word. But, independently of any difference originating in the language itself, some grammarians have called in question the propriety of distinctions maintained by most others. They have ranked together all the parts of speech, under a few general heads, and thus annihilated distinctions which have been sanctioned by the general usage of almost all nations and ages on which the light of science has shone. This generalization has been carried to the greatest length, in the Diversions of Purley, by the celebrated John Horne Tooke. This author reckons the noun and the verb the only essential parts of speech. He does not, however, acquiesce in the views of Mr. Harris, who, in his Hermes, also sets out with a twofold division of the subject. Mr. Harris considers the adverb, the preposition, and the conjunction, as merely subsidiary and inferior materials, which connect the other parts of speech, and give ornament and fulness of expression to the whole; while Mr. Tooke considers them, in every instance in which they are used, as equally essential with nouns and verbs, and refuses them a separate rank only because they are possessed of the same character with one or other of these parts of speech. But whatever may be the divisions of particular writers on this branch, in most languages, probably in all cultivated languages, the generality of grammarians distinguish the following: noun, pronoun, verb, participle, adverb, preposition, conjunction. In addition to these, the Latin and English grammarians admit the interjection among the parts of speech, although it is confessedly not necessary to the construction of the sentence, being only thrown in to express the affection of the speaker. In the Greek and English tongues, there is also the article prefixed to nouns, when they signify the common names of things, to point them out, and to show how far their signification extends. In the method of arrangement commonly followed in grammars, adjectives are

classed with substantives, and both are denominated nouns; but it is certain that, when examined philologically, an essential difference is discovered between them.

In what manner, or at what period, the different languages of the world were gradually formed and perfected, we are not informed by the sacred writers; nor is there any authentic history extant in which this inquiry can be answered, with any degree of certainty, till a much later period. The classical remains of Grecian and Roman literature, prove that these languages had, at one time, attained a state of perfection, which could be the result only of ages of civilization and literary culture; and it is probable that on these models, with some modifications suited to the genius of each, the grammars of the modern European languages have been gradually formed. The effects produced by conquerors, who settle in any particular country, are in few respects more perceptible than in the change introduced by conquest into the language of the original inhabitants. This observation is fully confirmed by the history of England; for the Saxons, after they had subdued the native Britons, introduced into the country their own language, which was a dialect of the ancient Teutonic, the parent of the present languages of Germany and the Low Countries. No alteration in the language of England occurred, after this event, for six hundred years, until the Conquest, in 1066, by William of Normandy, who promoted another change, by causing Norman French to be used, even in the courts of justice. The original British tongue, the Saxon, and the old French, are therefore the sources of the modern English; but augmented, from time to time, by the influx of Latin and Greek terms, with which commerce, the cultivation of learning, and the progress of the arts, have made us familiar.

From the countries which have supplied us with improvements in knowledge and art, we have also drawn the terms belonging to them. Thus, in music, sculpture, and painting, the terms are borrowed from Italy, where these arts have been carried to the highest perfection. The names and phrases employed in navigation, were received from the inhabitants of Flanders and Holland. France has supplied us with the language of fortification and military affairs, which she herself originally borrowed from Italy. The language of mathematics and philosophy is formed upon the Greek and Latin. The Saxon, and a few remains of the original British or Celtic, furnish most of the words in common use, as well as those employed in agriculture, and in several mechanic arts. The English language is now spoken, or understood, over a greater extent of the world than any other. Besides the British

Isles in Europe, it is the common tongue of the whole of the civilized parts of the United States of North America, also in many parts of Canada, and the British American islands. In Asia, English is the speech of the masters of India, ruling over a prodigious population, exceeding fifty millions. In the newly formed settlements in the great Southern Ocean, in New Holland, &c. it is the only language in use. With French and German, however, a traveller will more commodiously make his way over the continent of Europe.

### Section II.—English Grammar.

The Grammar of the English, or any other particular tongue, applies the principles of universal grammar to that tongue, according to the custom and usage established in it, by the best practice. Grammar treats of sentences, and of the several parts of which sentences are composed: sentences consist of words: words are formed by one or more syllables: syllables contain one letter, or several letters. Hence letters, syllables, words, and sentences, make up the whole of the grammar of any language.

English Grammar, after the celebrated Murray, whose system we shall follow in the present chapter, is usually divided into four parts:—Orthography, or the form and sound of letters, the combination of letters into syllables, and syllables into words;—Etymology, or the different sorts of words, their various modifications, and their derivations;—Syntax, or the union and right order of words in the formation of a sentence;—and, lastly, Prosody, or the just pronunciation, and poetical construction of sentences.

## ORTHOGRAPHY.

Orthography includes a knowledge of the sounds and powers of letters, syllables, and words, and lies at the foundation of all grammar.

Letters are the expression of any simple sound, or modification of sounds, or of the articulate utterance of the human voice, regulated by the organs of speech.

The letters of the English language, called the English Alphabet, are twenty-six in number, as follow:—

ROMAN CHARACTERS.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z.
a b c d e f g h i j k l m n o p q r s t u v w x y z.

ITALIC.

*A B C D E F G H I J K L M N O P Q R S T U V W X Y Z*
*a b c d e f g h i j k l m n o p q r s t u v w x y z.*

SOUND OF EACH LETTER.

ai, bee, see, dee, ee, ef, jee, aitch, eye, jay, kay, el, em, en, o, pee, cue, ar, ess, tee, you, vee, double-u, eks, wy, zed.

Sounds, and consequently letters, are naturally divided into two classes; the one produced by a simple emission of the voice, as, *a*, *o*, which may be lengthened or continued at pleasure. This class proceeding only from the voice, is therefore, from the Latin term for voice, called vowels. The other class of letters representing certain restraints, or modifications of simple sounds, can be pronounced only by the help of some vowel before or after them, and are therefore called consonants, from two Latin words, signifying to sound together.

When the vowels are brought together, so that each is sounded so quickly that the two together seem to form one sound composed of the two in succession, or that out of the two is formed a third sound different from both, these combinations of vowels are termed diphthongs, from two Greek words, signifying a double sound.

For example, a diphthong is the union of the two vowels *ea* in beat, *ou* in sound. A triphthong, which is formed on the same principles, is the union of three vowels; as *eau* in beau, *iew* in view.

A Syllable is a sound, either simple or compounded, pronounced by a single impulse of the voice, and constituting a word, or part of a word; as, *a*, *an*, *ant*.

Spelling is the art of rightly dividing words into their syllables, or of expressing a word by its proper letters.

Words.—A word of one syllable is a monosyllable; of two, a dissyllable; of three, a trisyllable; of four or more, a polysyllable.

All words are either primitive, or derivative.

A primitive word is that which cannot be reduced to any simpler word in the language; as, *man*, *good*, *content*, *York*.

A derivative word is that which may be reduced to another word in English of greater simplicity; as, *manful*, *goodness*, *contentment*, *Yorkshire*.

The English language abounds with derivative and compound words, which occasion some difficulty in the orthography, but a careful attention to the rules and examples in Murray's Grammar, or in most orthographical exercises, will enable the learner to acquire a habit of spelling with correctness.

# ETYMOLOGY.

Etymology treats of the different sorts of words, their various modifications, and their derivation.

There are in English nine sorts of words; or, as they are commonly called, Parts of Speech.

1. The Article, prefixed to substantives, to point them out, and to show how far their signification extends.

2. The Substantive, or Noun, which is the name of any thing that exists, or of which we have any notion.

3. The Adjective, added to a substantive, to express its quality.

4. The Pronoun, used instead of a noun, to avoid the too frequent repetition of the same word.

5. The Verb, a word which signifies *to be, to do,* or *to suffer.*

6. The Adverb, joined to a verb, an adjective, and sometimes to another verb, to express some quality or circumstance respecting it.

7. The Preposition, which serves to connect words with one another, and to show the relation between them.

8. The Conjunction, chiefly used to connect sentences, so as out of two or more sentences to make but one.

9. The Interjection, thrown in between the parts of a sentence, to express the passions or emotions of the speaker.

## ARTICLE.

An Article is a word prefixed to substantives, to point them out, and to show how far their signification extends; as, *a* garden, *an* eagle, *the* woman.

In English, there are but two articles, *a* and *the; a* becomes *an* before a vowel, and before a silent *h;* as, *an* acorn, *an* hour. But if the *h* be sounded, the *a* only is to be used; as, *a* hand, *a* heart, *a* highway.

*A* or *an* is styled the indefinite article: it is used in a vague sense, to point out one single thing of the kind, in other respects indeterminate; as, "Give me *a* book;" "Bring me *an* apple."

*The* is called the definite article, because it ascertains what particular thing or things are meant; as, "Give me *the* book;" "Bring me *the* apples;" meaning some particular book or apples referred to.

A substantive without any article to limit it, is generally taken in its widest sense; as, "A candid temper is proper for man;" that is, for all mankind.

## SUBSTANTIVE.

A Substantive or Noun is the name of any thing that exists, or of which we have any notion; as, *London*, *man*, *virtue*.

Substantives are either proper or common. Proper names or substantives are the names appropriated to individuals; as, *George*, *Charlotte*, *London*, *Thames*. Common names or substantives stand for kinds containing many sorts, or for sorts containing many individuals under them; as, *animal*, *man*, *tree*, &c.

To substantives belong *gender*, *number*, and *case*.

GENDER is the distinction of nouns with regard to sex. There are three genders, the *masculine*, the *feminine*, and the *neuter*.

The masculine gender denotes animals of the male kind; as, a *man*, a *horse*, a *bull*.

The feminine gender signifies animals of the female kind; as, a *woman*, a *duck*, a *hen*.

The neuter gender denotes objects which are neither male nor female; as, a *field*, a *house*, a *garden*. Some substantives naturally neuter are, by a figure of speech, converted into the masculine or feminine gender; as when we say of the sun, *he* is setting, and of a ship, *she* sails well, &c.

The English language has three methods of distinguishing the sex, namely:

1. By different words; as,

| MALE. | FEMALE. | MALE. | FEMALE. |
|---|---|---|---|
| Bachelor, | Maid. | Husband, | Wife. |
| Boy, | Girl. | Lad, | Lass. |

2. By a difference of termination; as,

| MALE. | FEMALE. | MALE. | FEMALE. |
|---|---|---|---|
| Actor, | Actress. | Lion, | Lioness. |
| Bridegroom, | Bride. | Poet, | Poetess. |

3. By a noun, pronoun, or adjective, being prefixed to the substantive; as,

| MALE. | FEMALE. |
|---|---|
| A cock-sparrow, | A hen-sparrow. |
| A man-servant, | A maid-servant. |

NUMBER is the consideration of an object as one or more.

Substantives are of two numbers, the singular and the plural.

The singular number expresses but one object; as, a *chair*, a *table*, a *box*, a *wife*.

The plural number signifies more objects than one; as, *chairs*, *tables*, *boxes*, *wives*.

Some nouns, from the nature of the things which they express, are used only in the singular; others only in the plural form: as, *wheat*, *pitch*, *gold*, *sloth*, *pride*, &c.; and *bellows*, *scissors*, *lungs*, *riches*, &c.

Some words are the same in both numbers; as, *deer*, *sheep*, *swine*, &c.

CASE.—English substantives have three cases, the nominative, the possessive, and the objective.

The nominative case simply expresses the name of a thing, or the subject of the verb; as, "The *boy* plays;" "The *girls* learn."

The possessive case expresses the relation of property or possession, and has an apostrophe, with the letter *s* coming after it; as, "The *scholar's* duty;" "My *father's* house."

When the plural ends in *s* the other *s* is omitted, but the apostrophe is retained; as, "On *eagles'* wings; the *drapers'* company."

Sometimes also, when the singular terminates in *s*, the apostrophic *s* is not added; as, "For *goodness'* sake; for *righteousness'* sake."

The objective case expresses the object of an action, or of a relation; and generally follows a verb active, or a preposition; as, "John assists *Charles*; they live in *London*."

English substantives are declined in the following manner:—

| | SINGULAR. | PLURAL. |
|---|---|---|
| *Nominative case.* | A mother. | Mothers. |
| *Possessive case.* | A mother's. | Mothers'. |
| *Objective case.* | A mother. | Mothers. |
| *Nominative case.* | The man. | The men. |
| *Possessive case.* | The man's. | The men's. |
| *Objective case.* | The man. | The men. |

## ADJECTIVE.

An Adjective is a word added to a substantive, to express its quality; as, "An *industrious* man;" "A *virtuous* woman;" "A *benevolent* mind."

In English, the adjective is not varied on account of gender, number, or case. Thus we say, "A *careless* boy; *careless* girls." The only variation which it admits is that of the degrees of comparison.

There are commonly reckoned three degrees of comparison; the *positive*, *comparative*, and *superlative*.

The positive state expresses the quality of an object, without any increase or diminution; as, *good*, *wise*, *great*.

The comparative degree increases the positive in signification; as, *better*, *wiser*, *greater*.

The superlative degree increases the positive to the highest degree; as, *best*, *wisest*, *greatest*.

## PRONOUN.

A Pronoun is a word used instead of a noun, to avoid the too frequent repetition of the same word; as, "The man is happy, *he* is benevolent, *he* is useful."

There are three kinds of pronouns; namely, the *personal*, the *relative*, and the *adjective pronouns*.

Personal Pronouns.—There are five personal pronouns; namely, *I*, *thou*, *he*, *she*, *it;* with their plurals, *we*, *ye* or *you*, *they*.

Personal pronouns admit of person, number, gender, and case.

The persons of pronouns are three in each of the numbers, namely:

| | |
|---|---|
| *I*, is the first person<br>*Thou*, is the second person<br>*He*, *she*, or *it*, is the third person | Singular. |
| *We*, is the first person<br>*Ye*, or *you*, is the second person<br>*They*, is the third person | Plural. |

The number of pronouns, like those of substantives, are two, the singular and the plural; as, *I*, *thou*, *he;* *we*, *ye*, *they*.

Gender has respect only to the third person singular of the pronouns, *he*, *she*, *it*. *He* is masculine; *she* is feminine; *it* is neuter.

Pronouns have three cases; the nominative, the possessive, and the objective.

The objective case of a pronoun has, in general, a form different from that of the nominative or the possessive case.

The Personal Pronouns are thus declined:

| PERSON. | CASE. | SINGULAR. | PLURAL. |
|---|---|---|---|
| *First.* | *Nom.* | I. | We. |
| | *Possess.* | Mine. | Ours. |
| | *Obj.* | Me. | Us. |
| *Second.* | *Nom.* | Thou. | Ye *or* you. |
| | *Possess.* | Thine. | Yours. |
| | *Obj.* | Thee. | You. |

| PERSON. | CASE. | SINGULAR. | PLURAL. |
|---|---|---|---|
| *Third Mas.* | *Nom.* | He. | They. |
| | *Possess.* | His. | Theirs. |
| | *Obj.* | Him. | Them. |
| *Third Fem.* | *Nom.* | She. | They. |
| | *Possess.* | Hers. | Theirs. |
| | *Obj.* | Her. | Them. |
| *Third Neuter.* | *Nom.* | It. | They. |
| | *Possess.* | Its. | Theirs. |
| | *Obj.* | It. | Them. |

Relative Pronouns are such as relate in general to some word or phrase going before, which is thence called the antecedent; they are, *who*, *which*, and *that;* as, "The man is happy *who* lives virtuously."

*What* is a kind of compound relative, including both the antecedent and the relative, and is equivalent to *that which;* as, "This is *what* I wanted;" that is to say, *the thing which* I wanted.

*Who* is applied to persons, *which* to animals and inanimate things; as, "He is a friend *who* is faithful in adversity;" "The bird *which* sung so sweetly is flown;" "This is the tree *which* produces no fruit."

*That*, as a relative, is often used to prevent the too frequent repetition of *who* and *which*. It is applied to both persons and things; as, "He *that* acts wisely deserves praise;" "Modesty is a quality *that* highly adorns a woman."

*Who* is of both numbers, and is thus declined:

| | SINGULAR AND PLURAL. |
|---|---|
| *Nominative.* | Who. |
| *Possessive.* | Whose. |
| *Objective.* | Whom. |

*Who*, *which*, *what*, are called *interrogatives* when they are used in asking questions; as, "*Who* is he?" "*Which* is the book?" "*What* are you doing?"

Adjective Pronouns are of a mixed nature, participating the properties both of pronouns and adjectives.

The adjective pronouns may be subdivided into four sorts, namely, the *possessive*, the *distributive*, the *demonstrative*, and the *indefinite*.

1. The *possessive* are those which relate to possession or property. There are seven of them; namely, *my*, *thy*, *his*, *her*, *our*, *your*, *their*.

2. The *distributive* are those which denote the persons or things that make up a number, as taken separately and singly; they are, *each*, *every*, *either;* as, "*Each* of his brothers is in a favourable situation;" "*Every* man must account for himself:" "I have not seen *either* of them."

3. The *demonstrative* are those which precisely point out the subjects to which they relate: *this* and *that*, *these* and *those*, are of this class; as, "*This* is true charity, *that* is only its image."

*This* refers to the nearest person or thing, and *that* to the more distant; as, "*This* man is more intelligent than *that*."

*This* indicates the latter, or last mentioned; *that* the former, or first mentioned; as, "Wealth and poverty are both temptations; *that* tends to excite pride, *this* discontent."

4. The *indefinite* are those which express their subjects in an indefinite or general manner. The following are of this kind: *some*, *other*, *any*, *one*, *all*, *such*, &c.

## VERB.

A Verb is a word which signifies *to be*, *to do*, or *to suffer;* as, "I *am*, I *rule*, I *am ruled*."

Verbs are of three kinds; *active*, *passive*, and *neuter*.

A verb active expresses an action, and necessarily implies an agent, and an object acted upon; as, *to love;* "I *love* Henry."

A verb passive expresses a passion or a suffering, or the receiving of an action: and necessarily implies an object acted upon, and an agent by which it is acted upon; as, *to be loved;* "Henry *is loved* by me."

A verb neuter expresses neither action nor passion, but being, or a state of being; as, "I *am*, I *sleep*, I *sit*."

To verbs belong *number*, *person*, *mood*, and *tense*.

Number and Person.—Verbs have two numbers, the singular and the plural; as, "I *love*, we *love*."

In each number there are three persons; as,

| | SINGULAR. | PLURAL. |
|---|---|---|
| *First person.* | I love. | We love. |
| *Second person.* | Thou lovest. | Ye love. |
| *Third person.* | He loves. | They love. |

Mood, or mode, is a particular form of the verb, showing the manner in which the being, action, or passion, is represented.

There are five moods of verbs: the *indicative*, the *imperative*, the *potential*, the *subjunctive*, and the *infinitive*.

The Indicative Mood simply indicates or declares a thing; as, "He *loves;* he *is loved:*" or it asks a question; as, "Does he *love?*"

The Imperative Mood is used for commanding, exhorting, entreating, or permitting; as, "*Depart* thou; *mind* ye; *let* us *stay; go* in peace."

The Potential Mood implies possibility, or liberty, power, will, or obligation; as, "It *may rain;* he *may go* or *stay;* I *can ride;* he *would walk;* they *should learn.*"

The Subjunctive Mood represents a thing under a condition, motive, wish, supposition, &c.; and is preceded by a conjunction, expressed or understood, and attended by another verb; as, "I will respect him, though he *chide* me;" "*Were* he good, he would be happy;" that is, *if* he *were* good.

The Infinitive Mood expresses a thing in a general and unlimited manner, without any distinction of number or person; as, *to act, to speak, to be feared.*

The *Participle* is a certain form of the verb, and derives its name from its participating, not only the properties of a verb, but also those of an adjective; as, "I am desirous of *knowing* him;" "*Admired* and *applauded,* he became vain;" "*Having finished* his work, he submitted it," &c.

There are three participles; as, *loving, loved, having loved.*

Tense being the distinction of time, seems to admit only of the present, past, and future; but some grammarians, to mark it more accurately, make it to consist of six variations; viz. the Present, the Imperfect, the Perfect, the Pluperfect, and the First and Second Future Tenses.

The Present Tense represents an action or event, as passing at the time in which it is mentioned; as, "I *rule,* I *am ruled;* I *think,* I *fear.*" The present tense likewise expresses a character, quality, &c. at present existing; as, "He *is* an able man;" "She *is* an amiable woman."

The Imperfect Tense represents the action or event, either as past or finished, or as remaining unfinished at a certain time past; as, "I *loved* her for her modesty and virtue;" "They *were* travelling post when he met them."

The Perfect Tense not only refers to what is past, but also conveys an allusion to the present time; as, "I *have* finished my letter;" "I *have* seen the person that was recommended to me."

The Pluperfect Tense represents a thing, not only as past, but also as prior to some other point of time specified in the sentence; as, "I *had* finished my letter before he arrived."

The First Future Tense represents an action as yet to come, either with or without respect to the precise time; as, "The sun *will* rise to-morrow;" "I *shall* see them again."

The Second Future intimates that the action will be fully

accomplished at or before the time of another future action or event; as, "I *shall have* dined at one o'clock;" "The two houses *will have* finished their business, when the king comes to prorogue them."

The conjugation of a verb is the regular combination and arrangement of its several numbers, persons, moods, and tenses. The conjugation of an active verb is styled the active voice; and that of a passive verb, the passive voice.

Auxiliary, or helping verbs, are those by the help of which the English verbs are principally conjugated. They are, *do*, *be*, *have*, *shall*, *will*, *may*, *can*, with their variations; and *let* and *must*, which have no variations.

The conjugation of the verbs at large would only be perplexing and tedious to the young beginner, and has, no doubt, often proved a great barrier to the progress of grammatical knowledge. The verb *to love* only, therefore, is here introduced as a specimen, to give the learner a general idea of it, and to show the utility of this branch of grammar. Other verbs may be conjugated as inclination and opportunity may serve.

An active verb is conjugated in the following manner:

## *TO LOVE.*

### INDICATIVE MOOD.

#### *Present Tense.*

| PERSON. SINGULAR. | PERSON. PLURAL. |
|---|---|
| 1. I love. | 1. We love. |
| 2. Thou lovest. | 2. Ye *or* you love. |
| 3. He, she, *or* it loveth *or* loves. | 3. They love. |

#### *Imperfect Tense.*

| | |
|---|---|
| 1. I loved. | 1. We loved. |
| 2. Thou lovedst. | 2. Ye *or* you loved. |
| 3. He loved. | 3. They loved. |

#### *Perfect Tense.*

| | |
|---|---|
| 1. I have loved. | 1. We have loved. |
| 2. Thou hast loved. | 2. Ye *or* you have loved. |
| 3. He hath *or* has loved. | 3. They have loved. |

*Pluperfect Tense.*

| PERSON. SINGULAR. | PERSON. PLURAL. |
|---|---|
| 1. I had loved. | 1. We had loved. |
| 2. Thou hadst loved. | 2. Ye *or* you had loved. |
| 3. He had loved. | 3. They had loved. |

*First Future Tense.*

| | |
|---|---|
| 1. I shall *or* will love. | 1. We shall *or* will love. |
| 2. Thou shalt *or* wilt love. | 2. Ye *or* you shall *or* will love. |
| 3. He shall *or* will love. | 3. They shall *or* will love. |

*Second Future Tense.*

| | |
|---|---|
| 1. I shall have loved. | 1. We shall have loved. |
| 2. Thou wilt have loved. | 2. Ye *or* you will have loved. |
| 3. He will have loved. | 3. They will have loved. |

IMPERATIVE MOOD.

| | |
|---|---|
| 1. Let me love. | 1. Let us love. |
| 2. Love thou, *or* do thou love. | 2. Love ye *or* you, *or* do ye love. |
| 3. Let him love. | 3. Let them love. |

POTENTIAL MOOD.

*Present Tense.*

| | |
|---|---|
| 1. I may *or* can love. | 1. We may *or* can love. |
| 2. Thou mayst *or* canst love. | 2. Ye *or* you may or can love. |
| 3. He may *or* can love. | 3. They may *or* can love. |

*Imperfect Tense.*

| | |
|---|---|
| 1. I might, could, would, *or* should love. | 1. We might, could, would, *or* should love. |
| 2. Thou mightst, couldst, wouldst, *or* shouldst love. | 2. Ye *or* you might, could, would, *or* should love. |
| 3. He might, could, would, *or* should love. | 3. They might, could, would, *or* should love. |

*Perfect Tense.*

| | |
|---|---|
| 1. I may *or* can have loved. | 1. We may *or* can have loved. |
| 2. Thou mayst *or* canst have loved. | 2. Ye *or* you may *or* can have loved. |
| 3. He may *or* can have loved. | 3. They may *or* can have loved. |

*Pluperfect Tense.*

| PERSON. SINGULAR. | PERSON. PLURAL. |
|---|---|
| 1. I might, could, would, *or* should have loved. | 1. We might, could, would, *or* should have loved. |
| 2. Thou mightst, couldst, wouldst, *or* shouldst have loved. | 2. Ye *or* you might, could, would, *or* should have loved. |
| 3. He might, could, would, *or* should have loved. | 3. They might, could, would, *or* should have loved. |

SUBJUNCTIVE MOOD.

*Present Tense.*

| | |
|---|---|
| 1. If I love. | 1. If we love. |
| 2. If thou love. | 2. If ye *or* you love. |
| 3. If he love. | 3. If they love. |

INFINITIVE MOOD.

*Present.* To love. *Perfect.* To have loved.

PARTICIPLES.

*Present.* Loving. *Perfect.* Loved.
*Compound Perfect.* Having loved.

Verbs passive are called regular when they form their perfect participle by the addition of *d* or *ed* to the verb; as, from the verb *to love* is formed the passive, I *am loved*, I *was loved*, I *shall be loved*, &c. A passive verb is conjugated by adding the perfect participle to the auxiliary *to be*, through all its changes of number, person, mood, and tense.

ADVERB.

An Adverb is a part of speech joined to a verb, an adjective, and sometimes to another adverb, to express some quality or circumstance respecting it; as, "He reads *well;*" "A *truly* good man;" "He writes *very correctly.*"

Some adverbs are compared; thus, *soon, sooner, soonest; often, oftener, oftenest.* Those ending in *ly* are compared by *more*, and *most;* as, *wisely, more wisely, most wisely.*

The following are a few of the adverbs:

| | | | | |
|---|---|---|---|---|
| Once | lastly | presently | quickly | not |
| now | before | often | perhaps | how |
| here | lately | much | indeed | more |

### PREPOSITION.

Prepositions serve to connect words with one another, and to show the relation between them. They are, for the most part, set before nouns and pronouns; as, "He went *from* London *to* York;" "She is *above* disguise;" "They are supported *by* industry."

The following is a list of the principal prepositions:—

| | | | | |
|---|---|---|---|---|
| Of | into | above | at | off |
| to | within | below | near | on *or* upon |
| for | without | between | up | among |
| by | over | beneath | down | after |
| with | under | from | before | about |
| in | through | beyond | behind | against |

### CONJUNCTION.

A Conjunction is a part of speech that is chiefly used to connect sentences; so as out of two or more sentences to make but one. It sometimes connects only words.

Conjunctions are principally divided into two sorts, the *copulative* and *disjunctive*.

The conjunction copulative serves to connect or to continue a sentence, by expressing an addition, a supposition, a cause, &c.; as, "He *and* his brother reside in London;" "I will go, *if* he will accompany me;" "You are happy, *because* you are good."

The conjunction disjunctive serves not only to connect and continue the sentence, but also to express opposition of meaning in different degrees; as, "*Though* he was frequently reproved, *yet* he did not reform;" "They came with her, *but* went away without her."

The following is a list of the principal conjunctions:

The *copulative*—And, that, both, for, therefore, if, then, since, because, wherefore.

The *disjunctive*.—But, than, though, either, or, as, unless, neither, nor, lest, yet, notwithstanding.

### INTERJECTION.

Interjections are words thrown in between the parts of a sentence, to express the passions or emotions of the speaker; as, "*Oh!* I have alienated my friends;" "*Alas!* I fear for life!" "*O* virtue! how amiable thou art!"

The following are some of the interjections: Oh! pish! heigh! lo! behold! ah! tush! fie! hush! hail!

### DERIVATION.

Words are derived from one another in various ways, namely. 1. Substantives are derived from verbs; as, from *to love* comes *lover*. 2. Verbs are derived from substantives, adjectives, and sometimes from adverbs; as, from *salt* comes *to salt*, from *warm* comes *to warm*, from *forward* comes *to forward*. 3. Adjectives are derived from substantives; as, from *health* comes *healthy*. 4. Substantives are derived from adjectives; as, from *white* comes *whiteness*. 5. Adverbs are derived from adjectives; as, from *base* comes *basely*.

## SYNTAX.

Syntax treats of the agreement and construction of words in a sentence.

A sentence is an assemblage of words, forming a complete sense.

Sentences are of two kinds, *simple* and *compound*. A simple sentence has in it but one subject, and one finite verb; as, "Life is short." A compound sentence consists of two or more simple sentences, joined together by one or more connective words; as, "Life is short, and art is long."

A phrase is two or more words rightly put together, making sometimes part of a sentence, and sometimes a whole sentence.

The principal parts of a simple sentence are, the subject, the attribute, and the object.

The subject is the thing chiefly spoken of; the attribute is the thing or action affirmed or denied of it; and the object is the thing affected by such action.

The nominative denotes the subject, and usually goes before the verb or attribute; and the word or phrase denoting the object follows the verb; as, "A wise man governs his passions." Here, *a wise man* is the subject; *governs,* the attribute, or thing affirmed; and *his passions*, the object.

Syntax principally consists of two parts, *concord* and *government*.

Concord is the agreement which one word has with another, in gender, number, case, or person.

Government is that power which one part of speech has over another, in directing its mood, tense, or case.

The following are the principal rules of Syntax, as laid down by Murray.

1. A verb must agree with its nominative case in number and person; as, "I learn;" "Thou art improved;" "The birds sing."

2. Two or more nouns, &c. in the singular number, joined together by a copulative conjunction, expressed or understood, have verbs, nouns, and pronouns agreeing with them in the plural number; as, "Socrates and Plato *were* wise, *they* were the most eminent philosophers of Greece;" "The sun that rolls over our heads, the food that we receive, the rest we enjoy, daily *admonish* us of a superior and superintending Power."

3. The conjunction disjunctive has an effect contrary to that of the conjunction copulative; for as the verb, noun, or pronoun is referred to the preceding terms taken separately, it must be in the singular number; as, "Ignorance or negligence *has* caused this mistake;" "John, or James, or Joseph, *intends* to accompany me;" "There *is* in many minds neither knowledge nor understanding."

4. A noun of multitude, or signifying many, may have a verb or pronoun agreeing with it, either of the singular or plural number; yet not without regard to the import of the word, as conveying unity or plurality of idea; as, "The meeting *was* large;" "The nation *is* powerful;" "My people *do* not consider, *they* have not known me;" "The multitude eagerly *pursue* pleasure, as *their* chief good;" "The council *were* divided in *their* sentiments."

5. Pronouns must always agree with their antecedents, and the nouns for which they stand, in gender and number; as, "This is the friend *whom* I love;" "That is the vice *which* I hate;" "The king and the queen had put on *their* robes;" "The moon appears, and *she* shines, but the light is not *her* own."

The relative is of the same person as the antecedent, and the verb agrees with it accordingly; as, "Thou *who lovest* Elizabeth;" "I, *who speak* from experience."

6. The relative is the nominative case to the verb, when no nominative comes between it and the verb; as, "The master *who* taught us;" "The trees *which* are planted."

When a nominative comes between the relative and the verb, the relative is governed by some word in its own member of the sentence; as, "He *who* preserves me, to *whom* I owe my being, *whose* I am, and *whom* I serve, is eternal."

7. When the relative is preceded by two nominatives of different persons, the relative and verb may agree in person with either, according to the sense; as, "*I* am the man *who command* you;" or, "I am the *man who commands* you."

8. Every adjective, and every adjective pronoun, belongs to a substantive, expressed or understood; as, "He is a *good*, as well as a *wise man*;" "*Few* are happy;" that is "*persons*;" "*This* is a pleasant walk;" that is, "*This walk* is," &c.

Adjective pronouns must agree in number with their substantives; as, "This book, these books; that sort, those sorts another road, other roads."

9. The article *a* or *an* agrees with nouns in the singular number only, individually or collectively; as, "A Christian, an infidel, a score, a thousand."

The definite article *the* may agree with nouns in the singular or plural number; as, "The garden, the houses, the stars."

The articles are often properly omitted: when used they should be justly applied, according to their distinct nature; as, "Gold is corrupting;" "The sea is green;" "A lion is bold."

10. One substantive governs another, signifying a different thing, in the possessive or genitive case; as, "My father's house;" "Man's happiness;" "Virtue's reward."

11. Active verbs govern the objective; as, "Truth ennobles *her*;" "She comforts *me*;" "They support *us*;" "Virtue rewards *her followers*."

12. One verb governs another that follows it, or depends upon it, in the infinitive mood; as, "Cease *to do* evil; learn *to do* well;" "We should be prepared *to render* an account of our actions."

The preposition *to*, though generally used before the latter verb, is sometimes properly omitted; as, "I heard him say it:" instead of, "*to* say it."

13. In the use of words and phrases which, in point of time, relate to each other, a due regard to that relation should be observed. Instead of saying, "The Lord *hath given*, and the Lord hath taken away;" we should say, "The Lord *gave*, and the Lord *hath taken* away." Instead of, "I *remember* the family more than twenty years;" it should be, "*I have remembered* the family more than twenty years."

14. Participles have the same government as the verbs from which they are derived; as, "I am weary with *hearing him*;" "She is *instructing us*;" "The tutor is *admonishing Charles*."

15. Adverbs, though they have no government of case, tense, &c. require an appropriate situation in the sentence, namely, for the most part before adjectives, after verbs active or neuter, and frequently between the auxiliary and the verb; as, "He made a *very sensible* discourse; he *spoke unaffectedly* and *forcibly*; and *was attentively heard* by the whole assembly."

16. Two negatives, in English, destroy one another, or are equivalent to an affirmative; as, "*Nor* did they *not* perceive him;" that is, "they did perceive him;" "His language, though inelegant, is *not ungrammatical;*" that is, "it is grammatical."

17. Prepositions govern the objective case; as, "I have heard a good character *of her;*" "*From him* that is needy, turn not away;" "A word to the wise is sufficient *for them;*" "We may be good and happy *without riches.*"

18. Conjunctions connect the same moods and tenses of verbs, and cases of nouns and pronouns; as, "Candour is *to be approved and practised;*" "If thou sincerely *desire*, *and* earnestly *pursue* virtue, she *will* assuredly *be found* by thee, *and prove* a rich reward;" "The master taught *her and me* to write;" "*He and she* were school-fellows."

19. Some conjunctions require the indicative, some the subjunctive mood after them. It is a general rule, that when something contingent or doubtful is implied, the subjunctive ought to be used; as, "*If I were* to write, he would not regard it;" "He will not be pardoned *unless* he *repent.*"

Conjunctions that are of a positive and absolute nature require the indicative mood; "*As* virtue *advances*, *so* vice *recedes;*" "He is healthy *because* he *is* temperate.

20. When the qualities of different things are compared, the latter noun or pronoun is not governed by the conjunction *than* or *as*, but agrees with the verb, or is governed by the verb or the preposition, expressed or understood; as, "Thou art wiser than I;" that is, "than I am;" "They loved him more than me;" that is, "more than they loved me;" "The sentiment is well expressed by Plato, but much better by Solomon than him;" that is, "than by him."

21. To avoid disagreeable repetitions, and to express our ideas in few words, an ellipsis, or omission of some words, is frequently admitted. Instead of saying, "He was a learned man, he was a wise man, and he was a good man;" we use the ellipsis, and say, "He was a learned, wise, and good man."

When the omission of words would obscure the sentence, weaken its force, or be attended with any impropriety, they must be expressed. In the sentence, "We are apt to love who love us," the word *them* should be supplied. "A beautiful field and trees," is not proper language; it should be, "Beautiful fields and trees;" or, "A beautiful field and fine trees."

22. All the parts of a sentence should correspond to each other; a regular and dependent construction throughout should

be carefully preserved. The following sentence is therefore inaccurate; "He was more beloved, but not so much admired as Cinthio;" it should be, "He was more beloved than Cinthio, but not so much admired."

## PROSODY.

This term, though frequently applied almost exclusively to poetry, yet may, with equal propriety, be rendered applicable to prose. It forms an important division of grammar, and consists of two parts; the former, which teaches the true pronunciation of words, and the latter, the laws of versification, for an account of which see Chapter XIV.

In the former are included Accent, Quantity, Emphasis, Pause, and Tone.

Accent is the laying a peculiar stress of the voice on a certain letter or syllable in a word, that it may be better heard than the rest, or distinguished from them; as, in the word 'presúme,' the stress of the voice must be on the letter *u*, and second syllable, 'súme,' which takes the accent. Accent is either principal or secondary. The principal accent is that which necessarily distinguishes one syllable in a word from the rest. The secondary accent is that stress which we may occasionally place upon another syllable, besides that which has the principal accent; in order to pronounce every part of the word more distinctly, forcibly, and harmoniously; thus, 'complaisant, caravan, and violin,' have frequently an accent on the first as well as on the last syllable, though a somewhat less forcible one. The same may be observed of 'repartee, referee, privateer, domineer,' &c. But it must be observed, that though an accent is allowed on the first syllable of these words, it is by no means necessary; they may all be pronounced with one accent, and that on the last syllable, without the least deviation from propriety. As emphasis evidently points out the most significant word in a sentence; so, where other reasons do not forbid, the accent always dwells with greatest force on that part of the word which, from its importance, the hearer has always the greatest occasion to observe: and this is necessarily the root or body of the word. But as harmony of termination frequently attracts the accent from the root to the branches of words, so the first and most natural law of accentuation seems to operate less in fixing the stress than any other.

The Quantity of a syllable is that time which is occupied in pronouncing it. It is considered as long or short. A vowel or syllable is long when the accent is on the vowel; which occasions

it to be slowly joined, in pronunciation, to the following letter. as, 'fāll, bāle, mōōd, hōūse, fēature.' A syllable is short when the accent is on the consonant; which occasions the vowel to be quickly joined to the succeeding letter; as 'an't, bon'net, hun'ger.' A long syllable requires double the time of a short one in pronouncing it; thus, 'mate' and 'note' should be pronounced as slowly again as 'mat' and 'not.' Unaccented syllables are generally short; as, 'ădmíre, bóldnĕss, sínnĕr.' But to this rule there are many exceptions; as, 'Álsō, éxīle, gángrēne, úmpīre, fóretāste,' &c.

By Emphasis is meant a stronger and fuller sound of voice, by which we distinguish some word or words on which we design to lay particular stress, and to show how it affects the rest of the sentence. Sometimes the emphatic words must be distinguished by a particular tone of voice, as well as by a greater stress. On the right management of the emphasis depends the life of pronunciation. If no emphasis be placed on any words, not only will discourse be rendered heavy and lifeless, but the meaning often left ambiguous. If the emphasis be placed wrong, we shall pervert and confound the meaning wholly. To give a common instance: such a simple question as this, "Do *you* ride to town to-day?" the answer may naturally be, "No, we send a servant in our stead." If thus: "Do you *ride* to town to-day?" answer, "No, we intend to walk." "Do you ride *to town* to-day?" "No, we ride into the country." "Do you ride to town *to-day?*" "No, but we shall to-morrow." In like manner, in solemn discourse, the whole force and beauty of an expression often depend on the emphatic word; and we may present to the hearers quite different views of the same sentiment, by placing the emphasis differently.

Pauses, or rests, in speaking and reading, are a total cessation of the voice, during a perceptible, and in many cases, a measurable space of time. There are two kinds of pauses; first, emphatical pauses; and next, such as mark the distinction of the sense. An emphatical pause is made, after something has been said of peculiar moment, and on which we desire to fix the hearer's attention. Sometimes, before such a thing is said, we usher it in with a pause of this nature. Such pauses have the same effect as a strong emphasis, and are subject to the same rules; especially to the caution just now given, not repeating them too frequently. For as they excite uncommon attention, and of course raise expectation, if the importance of the matter is not fully answerable to such expectation, they occasion disappointment and disgust. But the most frequent and the principal use of pauses, is, to mark the divisions of the sense, and at the same time to allow the

speaker to draw his breath; and the proper and delicate adjustment of such pauses, is one of the most nice and difficult articles of delivery. In all reading, and public speaking, the management of the breath requires a good deal of care, so as not to oblige us to divide words from one another, which have so intimate a connexion that they ought to be pronounced with the same breath, and without the least separation. Many sentences are miserably mangled, and the force of the emphasis totally lost, by the divisions being made in the wrong place. To avoid this, every one, while he is speaking or reading, should be very careful to provide a full supply of breath for what he is to utter. It is a great mistake to imagine, that the breath must be drawn only at the end of a period, when the voice is allowed to fall. It may easily be gathered at the intervals of the period, when the voice is only suspended for a moment; and, by this management, one may always have a sufficient stock for carrying on the longest sentence, without improper interruptions.

Tones are different both from emphasis and pauses; consisting in the modulation of the voice, the notes and variations of sound which we employ, in the expression of our sentiments. Emphasis affects particular words and phrases with a degree of tone or inflection of the voice; but tones, peculiarly so called, affect sentences, paragraphs, and sometimes even the whole of a discourse. How much of the propriety, the force and grace of discourse, must depend on these, will appear from this single consideration; that to almost every sentiment we utter, more especially to every strong emotion, nature has adapted some peculiar tone of voice. It is chiefly, therefore, in the proper use of these tones, that the life, spirit, beauty, and harmony of oral delivery consist.

This correct and natural language of the emotions is not so difficult to be attained as most readers seem to imagine. If we enter into the spirit of the author's sentiments, as well as into the meaning of his words, we shall not fail to deliver the words in properly varied tones. But when we recommend to readers an attention to the tone and language of emotions, we must be understood to do it with proper limitation. Moderation is necessary in this point, as it is in other things. For when reading becomes strictly imitative, it assumes a theatrical manner, and must be highly improper, as well as give offence to the hearers; because it is inconsistent with that delicacy and modesty, which on all occasions are indispensable.

## PUNCTUATION.

As Punctuation is intended to aid both the sense and the pronunciation of a sentence, it could not have been exclusively discussed under the part of Syntax, or Prosody; it is therefore placed under a distinct and subsequent article. Punctuation is the art of dividing a written composition into sentences, or parts of sentences, by points or stops, for the purpose of making the different pauses which the sense, and an accurate pronunciation require. The Comma represents the shortest pause; the Semicolon, a pause double that of the comma; the Colon, double that of the semicolon; and the Period, double that of the colon.

The points are marked in the following manner:

| | |
|---|---|
| The Comma , | The Colon : |
| The Semicolon ; | The Period . |

The Comma usually separates those parts of a sentence which, though very closely connected in sense, require a pause between them; as, "I remember, with gratitude, his love and services." "Charles is beloved, esteemed, and respected."

The Semicolon is used for dividing a compound sentence into two or more parts, not so closely connected as those which are separated by a comma, nor yet so little dependent on each other as those which are distinguished by a colon; as, "Straws swim on the surface; but pearls lie at the bottom."

The Colon is used to divide a sentence into two or more parts, less connected than those which are separated by a semicolon; but not so independent as separate distinct sentences; as, "Do not flatter yourselves with the hope of perfect happiness: there is no such thing in the world."

The Period.—When a sentence is complete and independent, and not connected in construction with the following sentence, it is marked with a period; as, "Fear God. Honour the King. Have charity towards all men."

Besides the points which mark the pauses in discourse, there are others that denote a different modulation of voice, in correspondence to the sense. These are,

The Interrogative point ?
The Exclamation point !
Parenthesis ( )

as, "Are you sincere?" "How excellent is a grateful heart!"

"Know then this truth (enough for man to know)
Virtue alone is happiness below."

The following characters are also frequently used in composition.

An Apostrophe, marked thus ' ; as tho', judg'd.

A Caret, marked thus ʌ ; as, I $^{am}$ʌ diligent.

A Hyphen, which is thus marked - ; as lap-dog, to-morrow.

The Acute Accent, marked thus ′; as fan′cy.

The Grave Accent, thus ̀; as, fàvour.

The proper mark to distinguish a long syllable is this ¯, as rōsy: and a short one, this ˘ ; as fŏlly. This last mark is called a Breve.

A Diæresis, thus marked ¨, shows that two vowels form separate syllables; as, Creätor.

A Section is thus marked §.

A Paragraph, thus ¶.

A Quotation has two inverted commas at the beginning, and two direct ones at the end of a phrase or passage; as,

" The proper study of mankind is man."

Crotchets or Brackets serve to enclose a particular word or sentence. They are marked thus [ ].

An Index or hand ☞ points out a remarkable passage.

A Brace { unites three poetical lines; or connects a number of words, in prose, with one common term.

An Asterisk, or little *, directs the reader to some note in the margin.

An Ellipsis is thus marked ——; as, K—g, for King.

An Obelisk, which is marked thus †, and Parallels thus ‖, together with the letters of the alphabet, and figures, are used as references to the margin.

The following words should begin with capitals:—

1st. The first word of every book, chapter, letter, paragraph, &c.

2d. The first word after a period, and frequently after the notes of interrogation and exclamation.

3d. The names of the Deity; as, God, Jehovah, the Supreme Being, &c.

4th. Proper names of persons, places, ships, &c.

5th. Adjectives derived from the proper names of places; as, Grecian, Roman, English, &c. This rule, though founded upon correct principles, is, however, frequently violated in modern printing and writing.

6th. The first word of a quotation in a direct form; as, " Always remember this ancient maxim, ' Know thyself.' "

7th. The first word of every line in poetry.

8th. The pronoun *I*, and the interjection *O!*

9th. Words of particular importance; as, the Reformation, the Restoration, the Revolution. This is not, however, much attended to, and may in general be left to the taste and discretion of the writer.

## PARSING.

When the pupil has passed through the whole of the preceding rules, and gained a thorough knowledge of the parts of speech, in all their moods, cases, &c., he should then proceed to some examples, in order to familiarize the subject to his mind, and be able to answer correctly, on being asked the grammatical construction of any word or sentence. This is done by what is called parsing, of which the following is a specimen.

### EXERCISE IN PARSING.

*The Lord's Prayer.*—Our Father who art in heaven! hallowed be thy name; thy kingdom come; thy will be done on earth, as it is in heaven; give us this day our daily bread; and forgive us our trespasses, as we forgive them who trespass against us: and lead us not into temptation, but deliver us from evil; for thine is the kingdom, and the power, and the glory, for ever. Amen.

*Our*, a pronoun, first person plural, from the singular *my; Father*, a substantive noun, masculine gender and singular number; *who*, relative pronoun, also singular and masculine, to agree with *Father*.

In our translation of the New Testament we have *which* in this passage of the Lord's Prayer instead of *who;* but *which* is the neuter gender of the pronoun, and consequently ought not to be applied to any person, human or divine.

*Art*, the second person singular of the present tense, indicative mood, of the auxiliary verb *to be; in*, a preposition; *heaven*, a substantive noun, in the objective case, governed by the preposition *in*.

*Hallowed*, participle past of the passive voice, of the active verb *to hallow; be*, the third person singular of the present tense of the subjunctive and imperative moods of the verb *to be; Hallowed be thy name* is equivalent to Let thy name be hallowed, or, May thy name be hallowed, reverenced, and held sacred; *name*, a substantive noun, singular number, objective case.

*Thy*, a pronoun of the second person singular, to agree with the following substantive *kingdom; come*, the third person singular of the present sense of the imperative and subjunctive moods, of the active verb *to come;* Thy kingdom come is equivalent to May or let thy kingdom come.

*Thy*, a pronoun possessive, as before; *will*, a substantive noun, neuter gender, and singular number, nominative case; *be*, adverb, as before; *done*, the participle of the active verb *to do; in*, a preposition; *earth*, a substantive noun, neuter gender, singular number, and objective case; *as*, a conjunction; *it*, a pronoun, neuter and singular, agreeing with *will; is*, third person singular of the present tense, indicative mood, of the verb *to be*, agreeing with the nominative *it; in*, a preposition; *heaven*, a substantive, singular, neuter gender, objective case, governed by *in*.

*Give*, second person singular, imperative mood, of the active verb *to give;* the nominative *thou* agreeing with it being suppressed, as, *give thou*, or *do thou give; us*, the personal pronoun *I* in the objective case plural, governed by the active verb *give; this*, an adjective pronoun; *day*, a substantive noun, singular number, neuter gender; *our*, a possessive pronoun; *daily*, a derivative adjective, formed from the substantive *day*, agreeing, in all circumstances, with the following substantive *bread*, of the neuter gender, singular number, and objective case, governed by the preceding verb *give*.

*And*, a conjunction; *forgive*, *forgive thou*, or *do thou forgive*, second person singular, imperative mood, of the active verb *to forgive*, placed in similar circumstances with the foregoing verb *give*, being connected with it by the copulative conjunction *and; us*, pronoun, in the objective case, governed by *forgive; our*, pronoun; *trespasses*, substantive noun, plural number, neuter gender, objective case, agreeing with *our*, and governed by *forgive; as*, a conjunction; *we*, pronoun, nominative plural of *I; forgive*, first person plural, present tense, indicative mood, agreeing with *we; them*, pronoun, plural number, objective case; *who*, relative pronoun, agreeing with the antecedent *them*, in being masculine or feminine, and plural, but not in case; for *who* is here the nominative to the following verb *trespass; trespass*, third person plural, present tense, indicative mood, active voice of the verb *to trespass*, agreeing with the pronoun before it, *who; against*, a preposition; *us*, objective case plural of the personal pronoun *I*.

*And*, conjunction; *lead*, for *lead thou*, or *do thou lead*, second person singular, imperative mood of the active verb *to lead; us*, pronoun, governed in the objective case by *lead; not*, an adverb; *into*, preposition; *temptation*, objective case of the substantive

noun, governed by preposition *into; but,* a disjunctive conjunction; *deliver,* second person singular, imperative, of the verb *to deliver; us,* pronoun; *from,* preposition; *evil,* an adjective noun, here used substantively, and equivalent to *the evil thing, the evil one, evil things in general.*

*For,* here used in the place of *because,* a conjunction; *thine,* a pronoun; *is,* third person singular, present of the indicative of the substantive verb *to be; the,* definite article; *kingdom,* substantive noun; *power, glory,* substantive nouns; *and,* a conjunction; *Amen,* a Hebrew word, indeclinable, signifying properly, truth, verity, and thence employed in an abridged form to express, May what has gone before really and truly be brought about! In the beginning of a sentence in the New Testament, Amen signifies of a truth, truly, verily, indeed.

In the foregoing exercise the imperative mood is used in the words *give, forgive* &c., because, in the Greek original of the New Testament, as well as in the Latin and other translations, words are employed to express the humble petitions of the Lord's Prayer, which, on other occasions, serve to convey a peremptory command. Thus, "Give me the bread," may signify a master's orders to his servants; while in the cases now under consideration, "Give us our bread," can signify no more than, "We humbly pray thee to give us our necessary food, and other comforts." The term imperative, therefore, is to be taken in its technical and grammatical and not in its proper literal meaning.

# CHAPTER IV.

## ARITHMETIC.

ARITHMETIC is often called the science of numbers, and explains their various properties, and the art of computing by them. It holds a distinguished rank among the mathematical sciences, and even surpasses them all in usefulness: its universal application to the common concerns of life, renders it a part of knowledge not merely desirable, but necessary to every one who wishes to be serviceable to society, to manage his own private affairs well, and to guard against fraud and imposition.

### SECTION I.—ORIGIN AND HISTORY.

NOTHING satisfactory can be offered respecting the origin and invention of Arithmetic: like almost every other useful art, its beginning must have been extremely rude and simple, the fruit of pure necessity; and it must have originated in the first ages of the world, when men began to form societies; for it is not easy to conceive how social intercourse could have been maintained, differences and disputes adjusted, bargains made, and trafficking carried on, without the necessary aid of computation. Shortly after the dispersion of mankind, the sciences were carried by the descendants of Shem into Chaldea, and the East; in these countries arithmetic was cultivated probably at an earlier period than in any other. The Phœnicians, who were descended from Canaan, the son of Ham, and settled on the eastern coast of the Mediterranean Sea, were the people who first of any addicted themselves to commerce, to which they made navigation subservient; and as they must have practised arithmetic to a great extent in their numerous mercantile transactions, succeeding nations have ascribed to them the invention.

Josephus informs us, that Abraham, having acquired a knowledge of arithmetic in the East, was the first who instructed the Egyptians in the art. By the Egyptian priests, arithmetic was cultivated with ardour, and constituted no inconsiderable part of their theology and philosophy. The Grecian philosophers, who

travelled into the East in quest of knowledge, transmitted this science from Egypt into Greece, whence it must (in common with other sciences) have received considerable improvements; among which the invention of the Multiplication Table is ascribed to Pythagoras, and a method of determining the Prime Number, to Eratosthenes. The Hebrews, Greeks, and Romans, represented numbers by the letters of the alphabet peculiar to each nation.

The Greeks very early made use of this method. The twenty-four letters, taken according to their order, at first denoted the numbers, 1, 2, 3, 4, 5, 7, 8, 9, 10, 20, 30, 40, 50, 60, 70, 80, 100, 200, 300, 400, 500, 600, 700, and 800; to which they added the three following ϛ, ϟ, ϡ, to represent 6, 90, and 900.

The Romans followed the like method, and besides characters for each rank of classes, introduced others for five, fifty, and five hundred. Their method is still used for distinguishing the chapters of books, and some other purposes. Their numeral letters and values are the following: I, one; V, five; X, ten; L, fifty; C, one hundred; D, five hundred; M, one thousand. Any number may be represented by repeating and combining these according to the following rules. (1.) When the same letter is repeated twice, or oftener, its value is represented as often. Thus II, signifies two; XXX, thirty; CC, two hundred. (2.) When a numeral letter is placed after one of greater value, their values are added: thus XI, signifies eleven; LXV, sixty-five; MDCXXVIII, one thousand six hundred and twenty-eight. (3.) When a natural letter is placed before one of greater value, the value of the less is taken from that of the greater; thus IV, signifies four; XL, forty; XC, ninety, CD, four hundred.

Sometimes IↃ is used instead of D for 500; and the value is increased ten times by annexing Ↄ to the right hand. Thus, IↃ signifies 500; IↃↃ, 5000; IↃↃↃ, 50,000. Also CIↃ is used for 1000; CCIↃↃ for 10,000; CCCIↃↃↃ for 100,000. Sometimes thousands are represented by drawing a line over the top of the numeral; $\overline{\text{V}}$ being used for five thousand; $\overline{\text{L}}$ for fifty thousand; $\overline{\text{CC}}$ two hundred thousand.

We have not the means of tracing the progressive improvement of Arithmetic among the ancients; judging from their works (which, however, are not always to be depended on), there is reason to suppose that the science advanced. Besides Addition, Subtraction, Multiplication, and Division, the ancients possessed methods of extracting the Square and Cube Roots; they were acquainted with the theory of Proportions; Arithmetical and

Geometrical Progression; and, in general, with the combinations of numbers, the reduction of ratios to their simplest form, &c.

About the year of Christ 200, a new kind of arithemetic, called sexagesimal, was invented, probably by Ptolemy, to remedy the difficulties of the common Greek and Roman method, especially with regard to fractions. Every unit was supposed to be divided into 60 parts, and each of these into 60 others, and so on. Thus from 1 to 59 were marked in the common way: then 60 was called a sexagesima prima, or first sexagesimal integer, and one single dash over it; so 60 was expressed thus, I′; and so on to 59 times 60, or 3540, which was thus expressed, LIX′. He now proceeded to 60 times 60, which he called a sexagesima secunda, and was thus expressed, I″; and so on till he came to 60 times 3600, which was a third sexagesimal, and expressed thus, I‴. If any number less than 60 was joined with these sexagesimals, it was added in its proper characters without any dash; thus, I′XV represented 60 and 15, or 75; IV′XXV is four times 60 and 25, or 265; X″II′XV is ten times 3600, twice 60 and 15, or 36,135, &c. Sexagesimal fractions were marked by putting the dash at the foot, or on the left hand of the letter: thus, $I_{,}$ or ′I, denoted $\frac{1}{60}$; $I_{,,}$, or ″I, $\frac{1}{3600}$, &c. So nearly did the invention of this method approach the Arabic, or common mode of notation: instead of sexagesimal progression, it was required only to substitute decimal, to make the signs of numbers from 1 to 9 simple characters, and to introduce the 0, a character which signifies nothing of itself, but which serves to fill up places. Though the sexagesimal whole numbers were soon laid aside after the introduction of the Arabic notation, sexagesimal fractions continued till the invention of decimals, and are even still used in the subdivisions of circular arcs and angles.

The method of notation which we now use, consisting of the common figures 1, 2, 3, &c. came into Europe from the Arabians, by the way of Spain. They appear to have been the first people who acquired the art from the Indians, and it was known among them for a considerable time before the Europeans became acquainted with it, which at length however they did, by means of Gerbert, a monk of Fleury, and afterwards pope, under the name of Sylvester II. This adventurous scholar, with the sole laudable view of acquiring those useful parts of learning of which the Europeans were then destitute, settled among the Arabs at Corduba. Having accomplished his purpose, he returned to his country about A.D. 960, and, among his other valuable acquisitions, enriched it with the knowledge of the Arabian, or rather Indian mode of notation, on which the great

convenience of arithmetic and its subsequent improvements are founded. This discovery, notwithstanding the advantages it promised, seems not to have been very eagerly adopted; about 150 years having elapsed after its introduction by Gerbert before it was known in Britain, and nearly 100 more before it was brought into common use. The advantage of this method consists principally in its brevity and precision; instead of employing twenty-four characters, only nine digits and a cipher were wanted. The symbols also are more simple, more appropriate, and determined; and therefore the powers of them are less liable to inaccuracy or confusion. With the symbols too, the scale of numerical calculations has been varied. The first improvement was the introduction of reckoning by tens, which, no doubt, took its rise from the obvious mode of counting by the fingers, as that was customary in the primary calculation of every nation except the Chinese.

This single process removes the difficulties and embarrassments of the preceding modes. Thus the signs of numbers, from 1 to 9, (as before observed) are considered as simple characters, denoting the simple numbers subjoined to the character; the cipher, 0, by filling the blanks, denotes the want of a number or unit in that place, and the addition of the columns in a ten-fold ratio, always expressing ten times the former, leads from tens, according to the order in which they stand, in a method at once most luminous and certain.

The oldest treatises extant upon the theory of arithmetic, are the seventh, eighth, and ninth books of Euclid's Elements, which treat of proportion and of prime and composite numbers. Nicomachus the Pythagorean wrote a Treatise on the Theory of Arithmetic, consisting chiefly of the distinctions and divisions of numbers into classes, as plain, solid, triangular, quadrangular, and the rest of the figurate numbers, as they are called, numbers odd and even, &c., with some of the more general properties of the several kinds. His Arithmetic was published at Paris in 1538. The next remarkable writer on this subject is Boethius, who is supposed to have copied most of his work from Nicomachus.

From this time, no remarkable writer on arithmetic appeared till about the year 1200, when Jordanus, of Namur, wrote a treatise on this subject, which was published and demonstrated by Joannes Faber Stapulensis, in the fifteenth century: and as learning advanced in Europe, the number of writers on arithmetic increased. About the year 1644, Regiomontanus, in his triangular tables, divided the radius into 10,000 parts, instead of 60,000; and thus tacitly expelled the sexagesimal arithmetic, which,

however, still remains in the division of time. Ramus, in his arithmetic, written about the year 1550, and published by Lazarus Schonerus in 1586, uses decimal periods in carrying on the square and cube roots to fractions. The same had been done before by our countrymen, Buckley and Record; but the first who published an express treatise on decimals was Simon Stevinius, about the year 1582. Dr. Wallis is the first who took much notice of circulating decimals; and the honour of inventing logarithms is unquestionably due to Lord Napier, baron of Merchiston, in Scotland, about the end of the sixteenth, or beginning of the seventeenth century. Arithmetic has thus advanced to a degree of perfection which the ancients could never have imagined possible, much less hoped to attain; and it may now be reckoned one of those few sciences which is, in its nature, capable of little further improvement.

## Section II.—Principal Rules of Arithmetic.

Arithmetic has five elementary rules; namely, Numeration or Notation, Addition, Subtraction, Multiplication, and Division; and these are the foundations of all the other arithmetical operations. These rules are usually divided into simple and compound; they are simple when they relate only to figures, and compound when these figures have reference to money, weights, measures, &c. It has been customary in many systems of arithmetic to introduce the compound immediately after the simple branch of each rule, but we have preferred the method of going through the simple rules first, which has been found in general an easier progression for the pupil.

## SIMPLE RULES.

## NOTATION, OR NUMERATION.

By Notation is meant the art of expressing numbers by a limited set of characters, called figures. The figures now used, and their powers, are the following: viz.—

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|
| one | two | three | four | five | six | seven | eight | nine. |

Another character, formed by the letter 0, is called a cipher,

signifying, when alone, nothing, but when joined to another figure it adds tenfold to its original value: thus—

| 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
|---|---|---|---|---|---|---|---|---|
| ten | twenty | thirty | forty | fifty | sixty | seventy | eighty | ninety. |

Other ciphers added still increase it tenfold: thus—

| 100 | 1000 | 200,000 | 1,000,000 |
|---|---|---|---|
| one hundred | one thousand | two hundred thousand | one million. |

The value of any number may be known by learning the following table, which must be read from right to left, beginning with No. 1, and calling it units:—

| Tens of thousands of millions. | Thousands of millions. | Hundreds of millions. | Tens of millions. | Millions. | Hundreds of thousands. | Tens of thousands. | Thousands. | Hundreds. | Tens. | Units. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

The figures together in one sum, thus, 10,987,654,321, would read or be called as follows: ten thousand nine hundred and eighty-seven millions six hundred and fifty-four thousand three hundred and twenty-one.

The method of classing numbers as above explained, may be extended to any length: but the most convenient method of assisting the mind to form an idea of large numbers is to divide them into periods of six figures each, beginning at the right, calling the first period units, the second millions, the third billions, &c., according to the following table, where it must be remarked, that each period contains units, tens, hundreds, thousands, tens of thousands. and hundreds of thousands, of the denomination marked over that period:

| Quadrillions. | | | Trillions. | | | Billions. | | | Millions. | | | Units. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hundreds of thousands of | Tens of thousands of | Thousands of | Hundreds of | Tens of | Units of | Hundreds of thousands of | Tens of thousands of | Thousands of | Hundreds of | Tens of | Units of | Hundreds of thousands of | Tens of thousands of | Thousands of | Hundreds of | Tens of | Units of |
| 6 | 1 | 7, | 8 | 3 | 4. | 1 | 3 | 0, | 9 | 2 | 7. | 6 | 3 | 1, | 8 | 2 | 9. | 4 | 0 | 3, | 1 | 7 | 2. | 8 | 9 | 5, | 2 | 6 | 3. |

The right hand place of each denomination is units of that denomination: but we do not pronounce the word units in reading except at the right hand place of all; instead of it we say, millions, billions, &c., naming the right hand figure of each period simply by the denomination marked over that period.

Case I.—To write any number.

*Rule.*—Place dots in a line from right to left to represent the places of units, tens, hundreds, &c., up to the highest denomination contained in the number to be expressed. Place each figure of the said number under the dot which represents its denomination; and when this is done, if there be any vacant places, fill them up with ciphers.

*Example.*—To write the number—One hundred and two thousand three hundred and four. Thus: make six dots to denote the places of units, tens, hundreds, thousands, tens of thousands, and hundreds of thousands; namely · · · · · ·; under the left hand dot place 1, under the fourth dot (from the right) place 2, under the third dot 3, and under the first dot 4; thus—1 23 4, and placing ciphers in the vacant spaces, the number will be 102304, as required.

Case II.—To read any number.

*Rule.*—Beginning at the right hand, name the place of each figure successively; namely, units, tens, hundreds, &c.; then, beginning at the left hand place, subjoin to the name of each figure that of its place.

*Example.*—Thus, to read the number 4321; point to the 1, and call it units; to the 2, and call it tens; to the 3, and call it hundreds; and to the 4, and call it thousands. Then (beginning at the left) subjoin to the 4 the name before given it, calling it four thousand; to the 3 in like manner subjoin the name of

hundreds, calling it three hundred; to the 2 subjoin the name tens, calling it two tens, or twenty; and to the 1 subjoin, or rather understand, the name units, calling it 1 unit, or simply one. The above number is therefore to be read, four thousand three hundred and twenty-one.

### APPLICATION.

The building of Rome took place seven hundred and fifty-three years before Christ. The computation of years from the birth of Christ did not begin to be used in history till the year seven hundred and forty-eight. The current year of the Christian era is one thousand eight hundred and thirty-nine. Write down in figures the above several numbers of years.

*Answer.*—753, 748, 1839.

It has been remarked, that the planets perform their revolutions with so much exactness, as never once to fail; but, for almost 6000 years, come constantly about to the same period, without the difference of the hundredth part of a minute.

Mercury is said to be about 37,000,000 of miles from the Sun; Venus, 68,000,000; the Earth, 95,000,000; Mars, 145,000,000; Jupiter, 495,000,000; and the Georgium Sidus, 1,800,000,000. Write down in words the above several figures.

*Answer.*—Mercury, thirty-seven millions; Venus, sixty-eight millions; the Earth, ninety-five millions; Mars, one hundred and forty-five millions; Jupiter, four hundred and ninety-five millions; and the Georgium Sidus, eighteen hundred millions.

## ADDITION.

Simple Addition teaches to collect two or more given numbers of one denomination into one, and to express the amount correctly.

*Rule.*—Place the numbers under each other, so that units may stand under units, tens under tens, hundreds under hundreds, &c. Add up the figures in the column of units, find how many tens are contained in the sum, and what there is over. Set down what there is over below the units, and carry one from every ten to the next column; that is, add as many ones to it as there were tens found in the last sum: add up this column as before, and in like manner proceed, till all the columns are added; observing to put under the last column the whole sum it amounts to.

## EXAMPLES.

### No. 1.

| | |
|---|---|
| 5<br>2<br>7<br>3<br>—<br>17<br>— | EXPLANATION.<br><br>3 and 7 are 10<br>10 and 2 are 12<br>12 and 5 are 17<br><br>Put down 17. |

### No. 2.

1357
209
2163
7075
10804

EXPLANATION.

*First Column.*

5 and 3 are 8
8 and 9 are 17
17 and 7 are 24

Set down under the first column the right hand figure, 4; carry on to begin the second column the left hand figure, 2.

*Second Column.*

2 and 7 are 9
9 and 6 are 15
15 and 5 (miss 0) are 20

Set down under the second column the right hand figure, 0; carry on to begin the third column the left hand figure, 2.

*Third Column.*

2 and 1 (miss 0) are 3
3 and 2 are 5
5 and 3 are 8

Put down 8. Nothing to carry on.

*Fourth Column.*

7 and 2 are 9
9 and 1 are 10

Put down 10.

| No. 3. | No. 4. | No. 5. | No. 6 |
|---|---|---|---|
| 5465 | 4167 | 8197 | 7292 |
| 9765 | 3297 | 2336 | 8678 |
| 4594 | 6459 | 6839 | 1627 |
| 6754 | 9645 | 8836 | 8901 |
| 1263 | 8167 | 6785 | 321 |
| 4613 | 3267 | 6976 | 6718 |
| 32454 | 35002 | 39969 | 33537 |

Operations under this rule are proved by cutting off the top line, and, after adding up the whole as before directed, adding up all the lines below the line cut off, and placing the sum below that of the whole; then if this last sum be added to the line cut off, and the result be equal to the sum of the whole first found, the work is right. Thus—

| | |
|---|---|
| 139 | |
| 7385 | |
| 64 | |
| 9 | |
| 827 | |
| 8424 | sum of the whole. |
| 8285 | sum, exclusive of the top line. |
| 8424 | proof; it being like the sum of the whole. |

Various other methods of proving operations in Addition have been given, but the most simple appears to be that of casting up every column the reverse way; that is, beginning each at the top instead of the bottom. This introduces the learner to a fresh connexion or association of the same figures, and if the result agrees in both ways it may be considered as right. This method of proof is adopted by most of the large mercantile and banking houses in the metropolis, and has scarcely ever been found to fail in discovering and detecting errors, if the operation is conducted with care and fidelity.

## SUBTRACTION.

Simple Subtraction teaches the art of taking one number of the same denomination from another, in order to find the remainder.

*Rule.*—Place the lesser number under the greater; draw a line under them, and, beginning at the right hand, take each figure in the lower line from the figure under which it stands; but if the figure in the lower line is greater than that in the upper, then, in numbers of one denomination, ten must be borrowed and added to the figure in the upper line; then take the figure in the lower line from the sum, and write down the remainder; but for every ten thus borrowed, one must be paid or added to the next left hand figure in the lower line.

No. 1.

7634
4927
2707

EXPLANATION

Take 7 from 4 you cannot, therefore borrow 10, which, added to the 4, make 14: then 7 from 14 leaves 7; set down 7, and carry 1 for the 10 borrowed, which, added to the 2, make 3: then 3 from 3 leaves 0; set down 0: 9 from 6 you cannot; borrow 10, which, added to the 6, make 16; then 9 from 16 leaves 7; set down 7, and carry 1, for the 10 borrowed, to the 4, which make 5; then 5 from 7 leaves 2; set down 2. In order to prove it, add the two lowest lines together, and if the product agrees with the top line, the work is right.

| No. 2. | No. 3. | No. 4. | No. 5. |
|---|---|---|---|
| 953467 | 501746 | 624537 | 814537 |
| 765578 | 345670 | 257048 | 225653 |
| 187889 | 156076 | 367489 | 588884 |

## MULTIPLICATION.

Multiplication is a compendious mode of Addition, and teaches to find the amount of any given number by repeating it any proposed number of times. In this rule particular attention should be paid to the following table, which must be learned completely by heart before any thing can be done by the pupil to advantage:—

## THE MULTIPLICATION TABLE.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 |
| 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 |
| 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 | 77 | 84 |
| 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 |
| 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90 | 99 | 108 |
| 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 |
| 11 | 22 | 33 | 44 | 55 | 66 | 77 | 88 | 99 | 110 | 121 | 132 |
| 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 | 120 | 132 | 144 |

### EXPLANATION OF THE TABLE.

To find the product of two numbers, look for one of them in the top line, and for the other in the left hand column; then, the the number which stands directly below the first, and level with the second, is the product required: thus, to find 3 times 5—look for three at the top, and 5 on the left hand; then, below the 3, and level with the 5, stands 15; which is the product of 3 and 5. In like manner, to find 10 times 9; under 10, and level with 9, stands 90, the product. To find 6 times 8; under 6, and level with 8, stands 48, the product.

In Multiplication, three terms are to be observed—1. The multiplicand, or the number to be multiplied. 2. The multiplier, or the number to multiply with. 3. The product, which is the result of the work, or the answer to the question.

CASE I.—To multiply by any number not exceeding 12.

*Rule.*—Beginning at the figure in the unit's place of the multiplicand, multiply that, and each of the succeeding figures in order, by the multiplier, observing at each step to set down the result, as in addition, and carry the tens to the product in the next step.

EXAMPLES.

No. 1.

7654
4
30616

EXPLANATION.

4 times 4 are 16; set down the right hand figure 6, and carry the left hand figure 1: 4 times 5 are 20; 20 and 1 are 21; set down the 1, and carry the 2: 4 times 6 are 24; 24 and and 2 are 26; set down the 6, and carry the 2: 4 times 7 are 28; 28 and 2 are 30; set down 30.

| | No. 2. | No. 3. | No. 4. |
|---|---|---|---|
| Multiplicand . | 367 | 543813 | 7543852 |
| Multiplier . . . | 5 | 9 | 6 |
| Product . . . . | 1835 | 4894317 | 45263112 |

CASE II.—When the multiplier exceeds 12, and is a composite number; that is, when any two numbers multiplied together will produce it.

*Rule.*—First, find the two numbers which, multiplied together, will produce the number required; then multiply the multiplicand by one of the component parts, and that product by the other.

EXAMPLE.

Multiply 2761 by 14

7
19327
2
38654

EXPLANATION.

Here 14 is a composite number, because 7 times 2 are 14: therefore multiply the multiplicand 2761 by 7, (as in the last case,) and that product 19327 by the other component part (2): and the last product 38654 is the answer, and is equal to 14 times 2761.

CASE III.—When the multiplier is above 12, and is not a composite number; that is, when no two numbers multiplied together will produce it.

*Rule.*—Multiply the multiplicand by each figure in the multiplier respectively, beginning with the units figure, observing to place the first figure of each product under the figure multiplied by; then add the two products together.

EXAMPLE.

Multiply 2706 by 13

```
  13
----
8118
2706
----
35178
```

EXPLANATION.

Here 13 is not a composite number, because no two numbers multipled together will produce it: therefore, place the multiplier, 13, under the multiplicand, 2706, and multiply it by the 3, placing the first figure of the product (8) under the figure 3 multiplied by: then multiply the multiplicand 1, placing the first figure of the product (6) under the 1. Lastly, add the products together, and the sum 35178, will be the product of 2706 multiplied by 13.

CASE IV.—It frequently happens that the multiplier has one or more ciphers on the right hand of it.

*Rule.*—Proceed with the multiplication as if there were no ciphers, and then place the number of ciphers, whatever the number may be, on the right hand of the product.

EXAMPLES.

No. 1.

Multiply 3764 by 30.

```
3764
  30
------
112920
```

EXPLANATION.

In this example the multiplicand is multiplied by 3, as in Case I.; and then the cipher is placed on the right hand of the product.

No. 2.

Multiply 3764 by 3200.

3764
8
30112
4
12044800

EXPLANATION.

In this example, 8 times 4 being 32, the multiplicand is multiplied by the 8, and that product by 4, as in Case II.; and the ciphers are placed on the right hand.

No. 3.

Multiply 3764 by 19000.

3764
19
33876
3764
71516000

EXPLANATION.

In this example the multiplication is performed, and care taken to place the first figures of the product under the figure multiplied by, as explained in Case III. The ciphers are placed as before on the right hand.

Multiplication is proved by repeating the operation, using the multiplier for the multiplicand, and the multiplicand for the multiplier. Or it may be done by casting out the nines; that is, cast out the nines of the multiplier and multiplicand, and set down the remainders. Multiply the remainders together, and if the excess of nines in their product be equal to the excess of nines in the total product, the work may be deemed right. The best method of proving Multiplication is by division; and if that be adopted, the two rules must be learned at the same time. Then the proof of each example in Multiplication becomes a sum in Division, and *vice versâ*.

## DIVISION.

Simple Division teaches to find how often one number, called the divisor, is contained in another number, called the dividend;

both being of the same denomination; or to divide the latter number into as many equal parts as there are units in the former. The number arising from the operation, and which we are in quest of, is called the quotient; and if any thing be over at the end of the operation, it is called the remainder.

CASE I.—When the divisor does not exceed 12.

*Rule.*—Find how often the divisor is contained in the least number possible of the left hand figures in the dividend; put down the number denoting how many, and carry the remainder (if any) to the next figure, calling every 1 you carry 10; divide the resulting number as before, put down the quotient figure, carry the remainder as so many tens to the next, &c. Proceed in this manner, till all the figures in the dividend have been divided.

EXAMPLES.

| | No. 1. | No. 2. | No. 3. |
|---|---|---|---|
| | Divid. | | |
| Divisor . . | 4 ) 78906 ( 2 rem. | 5 ) 34567 ( 2 | 12 ) 76677246 ( 6 |
| Quotient . . . | 19726 | 6913 | 6389770 |
| | 4 | 5 | 12 |
| Proof . . . . . | 78906 | 34567 | 76677246 |

EXPLANATION.

In the first of these examples, say, 4's in 7, once and 3 over, which considered as placed before 8, the next figure in the dividend, makes 38: then 4's in 38, 9 times and 2 over, which makes the next figure in the dividend 29: then 4's in 29, 7 times and 1 over, which makes 0, the next of the dividend, 10: 4's in 10, twice and 2 over, which makes 6, the last figure of the dividend, 26: lastly, 4's in 26, 6 times; and the remainder is 2. In order to prove this or any other example, multiply the quotient by the divisor, and take in the remainder in the first place, or place of units; and if the product be the same with the dividend, the division is right.

CASE II.—When the divisor exceeds 12, and is such a number that any two figures in the multiplication table multiplied together will produce it, then the quotient may be found at two divisions in the same manner that the product may be found at two multiplications. But when the divisor consists of more figures than one, and cannot be thus produced:—

*Rule.*—Seek how many times it is contained in the same number of figures on the left hand of the dividend; and place

the number thus obtained at the right, as the first of the quotient, (see Example No. 1, following,) by which multiply the divisor, and place the product under the said figures of the dividend, drawing a line underneath it; then subtract the product from the figures of the dividend, and to the remainder bring down another figure and proceed as before.

If the divisor be a larger amount than the same number of figures in the dividend, take in the next figure, as in Example No 3

EXAMPLES.

No. 1.

Divid.

Divisor . . 252 ) 46242 ( 183 quotient.
252
2104
2016
882
756
Remainder . . 126

No. 2.

342 ) 48754 ( 142
342
1455
1368
874
684
190

No. 3.

568 ) 4784871 ( 8424
4544
2408
2272
1367
1136
2311
2272
39

EXPLANATION.

In the Example No. 1, after inquiry, you find it will not go twice, therefore set down 1 in the quotient, and place 252 under 462 of the dividend, and, after subtraction, the remainder is 210; to which bring down 4 from the dividend, and

the sum is 2104; then seeking again, you find it will bear 8 times, which placed in the quotient, and the divisor 252 multiplied by it, the product is 2016, to be subtracted from 2104; which being done, the remainder is 88; to which 2, the last figure of the dividend, being brought down, it makes 882; then seeking again, you find it will go 3 times; and the product of the divisor multiplied by 3, is 756; which subtracted from 882, there is 126 from the true remainder.

CASE III.—When a cipher or ciphers are found in the divisor.

*Rule.*—Separate them with a dash of the pen from the rest of the divisor, and also cut off as many figures or ciphers from the right of the dividend, as you cut off ciphers from the divisor; and divide the remaining figures towards the left hand by the remaining figures of the divisor: then, in order to find the true remainder, bring down the figure which was cut off in the dividend, and place it to the right of the lowest row of figures, as in the following example:—

EXAMPLE.

```
16|0 ) 4295|2 ( 268
       32
      ---
      109
       96
      ---
       135
       128
      ---
        72
      ===
```

Here the cipher is cut off from the divisor, and 2 from the dividend: work it according to the rule, and you will find the quotient 268, and the remainder 72.

Multiplication and Division will prove each other; for in proving Multiplication, if you divide the product by the multiplier, the quotient will be the multiplicand; or in proving Division, if you multiply the divisor by the quotient, the product will be the dividend.

## REDUCTION.

REDUCTION is the bringing quantities of one name or denomination into quantities of another name or denomination, without

changing the value. This is done either by multiplication or division.

Case I.—When great names are to be brought into small, as pounds into shillings, shillings into pence, or pence into farthings, it is performed by multiplication.

*Rule.*—Multiply the given quantity by as many of the next lower denomination as are contained in the denomination to be reduced.

EXAMPLE.

Reduce £2 into shillings.

£2
20
40 shillings.

EXPLANATION.

Pounds being greater than shillings, the reduction is done by multiplication. Therefore, if the £2 is multiplied by 20, it will give the answer. It is evident there must be 20 times as many shillings as there are pounds, because 20 shillings make a pound.

Case II.—When small names or denominations are to be brought into great, as farthings into pence, pence into shillings, or shillings into pounds, it is performed by division.

*Rule.*—Divide the given quantity by as many of its own denomination as are contained in the denomination to which it is to be reduced.

EXAMPLE.

Reduce 240 farthings into pence.

4 ) 240 farthings.
60 pence.

EXPLANATION.

Farthings being a less name than pence, the reduction is performed by division. Therefore, if 240 farthings are divided by 4, (because 4 farthings make a penny,) it will give the answer. It is evident there cannot be so many pence as there are farthings by four times, because a farthing is only the fourth part of a penny.

# COMPOUND RULES.

## COMPOUND NUMERATION.

NUMERATION of compound quantities differs from numeration of whole numbers; for although the relative value of each figure, as to its position in each simple quantity, is the same as in whole numbers, yet compound quantities are constructed upon arbitrary principles, differing in different countries, each lower denomination bearing some proportion to the next higher. Thus, 1 farthing is the fourth part of a penny; 1 penny, the twelfth part of a shilling; 1 shilling, the twentieth part of a pound. Upon this principle, the following table of money, as used in all commercial transactions in our own country, is constructed:—

| | | |
|---|---|---|
| 4 farthings . . | make | . . 1 penny. |
| 12 pence . . . | „ | . . 1 shilling. |
| 20 shillings . . | „ | . . 1 pound. |

Numeration of compound quantities, then, teaches to express or arrange such quantities according to the relative value of each; and this is done by beginning with the highest denomination in regular succession, according to its respective value. Care should be taken to separate each simple quantity from the next, by two small dots or strokes; and whenever the regular succession of simple quantities is broken, the deficiency must be supplied by a nought or cipher. It should be observed, however, that pence and farthings are never separated by dots or strokes, as the other simple quantities.

### ABBREVIATIONS.

| | | |
|---|---|---|
| £ | stands for | Pounds. |
| *s.* | „ | Shillings. |
| *d.* | „ | Pence. |
| *qrs.* | „ | Farthings. |

| | |
|---|---|
| ¼ | stands for one quarter, or one farthing. |
| ½ | stands for one half, or one half-penny. |
| ¾ | stands for three quarters, or three farthings. |

### EXAMPLES.

Express the following quantities in figures:—

Twenty-seven pounds ten shillings and sixpence.
*Answer.*—£27 „ 10 „ 6.

Five hundred and ten pounds ten shillings and tenpence three farthings.

*Answer.*—£510 „ 10 „ $10\frac{3}{4}$.

Express the following quantities in words :—

£27 „ 0 „ $3\frac{1}{2}$.

*Answer.*—Twenty-seven pounds and threepence half-penny

£139 „ 6 „ $2\frac{1}{4}$.

*Answer.*—One hundred and thirty-nine pounds six shillings and twopence farthing.

The notation of weights and measures is conducted on the same principles by the help of abbreviations, which will be introduced in a succeeding part of this chapter.

## COMPOUND ADDITION.

Compound Addition teaches to collect several numbers of different denominations into one total. The reason of this rule is evident : for, in addition of money, as 1 in the pence is equal to 4 in the farthings ; 1 in the shillings to 12 in the pence ; and 1 in the pounds to 20 in the shillings ; carrying as directed is nothing more than providing a method of digesting the money arising from each column properly in the scale of denomination ; and this reasoning will hold good in the addition of numbers of any denomination whatsoever, as weights and measures, &c.

### MONEY

Before the learner proceeds in this part of arithmetic, it is absolutely necessary to learn perfectly the following tables :—

*Pence Table.*

| *d.* | | *s.* | *d.* | *d.* | | *s.* | *d.* |
|---|---|---|---|---|---|---|---|
| 20 | are | 1 | 8 | 84 | are | 7 | 0 |
| 24 | | 2 | 0 | 90 | | 7 | 6 |
| 30 | | 2 | 6 | 96 | | 8 | 0 |
| 36 | | 3 | 0 | 100 | | 8 | 4 |
| 40 | | 3 | 4 | 108 | | 9 | 0 |
| 48 | | 4 | 0 | 110 | | 9 | 2 |
| 50 | | 4 | 2 | 120 | | 10 | 0 |
| 60 | | 5 | 0 | 130 | | 10 | 10 |
| 70 | | 5 | 10 | 132 | | 11 | 0 |
| 72 | | 6 | 0 | 140 | | 11 | 8 |
| 80 | | 6 | 8 | 144 | | 12 | 0 |

### *Shillings Table.*

| *s.* | | | | | £ | *s.* | *d.* | |
|---|---|---|---|---|---|---|---|---|
| 20 | - | make | - | | 1 | 0 | 0 | sterling, or a sovereign. |
| 21 | - | - | - | - | 1 | 1 | 0 | |
| 30 | - | - | - | - | 1 | 10 | 0 | |
| 40 | - | - | - | - | 2 | 0 | 0 | |
| 50 | - | - | - | - | 2 | 10 | 0 | |
| 60 | - | - | - | - | 3 | 0 | 0 | |
| 70 | - | - | - | - | 3 | 10 | 0 | |
| 80 | - | - | - | - | 4 | 0 | 0 | |
| 90 | - | - | - | - | 4 | 10 | 0 | |
| 100 | - | - | - | - | 5 | 0 | 0 | |

*Rule.*—Place the numbers so that those of the same denomination may stand directly under each other, and draw a line below them. Add up the figures in the lowest denomination, and find how many ones of the next higher denomination are contained in their sum. Write down the remainder, and carry the ones to the next denomination; with which proceed as before; and so on, through all the denominations to the highest, whose sum must be all written down; and this sum, together with the several remainders, is the total sum required.

EXAMPLES.

| No. 1. | | No. 2. | | No. 3. | | | No. 4. | | |
|---|---|---|---|---|---|---|---|---|---|
| *s.* | *d.* | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* |
| 0 | $4\frac{1}{4}$ | 0 | 3 | 1 | 2 | 4 | 32 | 4 | 7 |
| 0 | $3\frac{1}{2}$ | 2 | 7 | 0 | 3 | 6 | 653 | 2 | $6\frac{1}{2}$ |
| 0 | $7\frac{3}{4}$ | 3 | 4 | 6 | 7 | 9 | 475 | 7 | 2 |
| 0 | 5 | 2 | 7 | 1 | 4 | 2 | 45 | 6 | 7 |
| 0 | $6\frac{1}{4}$ | 15 | 9 | 5 | 3 | 4 | 2 | 3 | $2\frac{1}{2}$ |
| 2 | $2\frac{3}{4}$ | £1 | 4 6 | 14 | 1 | 1 | 1208 | 4 | 1 |

EXPLANATION.

Thus, in the first example, begin with the farthings, and say:—1 and 3 are 4, and 2 are 6, and 1 are 7; which being 1 penny and 3 farthings, write $\frac{3}{4}$ underneath, and carry 1 to the pence: then 1 and 6 are 7, and 5 are 12, and 7 are 19, and 3 are 22, and 4 are 26; then 26 pence being 2 shillings

and twopence over, place 2 under the column of pence and 2 under that of shillings; the whole sum making two shillings and twopence three farthings.

The other examples must be performed in the same manner, taking care to carry one pound for every 20 shillings, and one for every 10 in the pounds, as in simple addition.

## AVOIRDUPOIS WEIGHT.

By this weight are weighed all kinds of heavy goods, and all grocery wares; as tobacco, sugars, fruit, and drugs; also brass, copper, lead, tin, pewter, pitch, tar, resin, hemp, flax, soap, salt, &c.

### *Table.*

| | | |
|---|---|---|
| 4 | quarters make 1 dram, marked - - | *dr.* |
| 16 | drams—1 ounce - - - - - - - | *oz.* |
| 16 | ounces—1 pound - - - - - - - | *lb.* |
| 28 | pounds—1 quarter of a hundred wght. | *qr.* |
| 4 | quarters—1 hundred weight - - - | *C.* |
| 20 | hundred weight—1 ton - - - - | *T.* |

### EXAMPLES.

| No 1. | | | No. 2. | | | No. 3. | | | No. 4. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *C.* | *qr.* | *lb.* | *C.* | *qr.* | *lb.* | *C.* | *qr.* | *lb.* | *lb.* | *oz.* | *dr.* |
| 5 | 1 | 16 | 24 | 2 | 12 | 9 | 1 | 16 | 24 | 11 | 12 |
| 4 | 2 | 24 | 42 | 2 | 0 | 4 | 3 | 26 | 42 | 14 | 15 |
| 6 | 3 | 6 | 16 | 1 | 12 | 7 | 1 | 0 | 64 | 10 | 11 |
| 7 | 1 | 12 | 25 | 3 | 24 | 5 | 3 | 27 | 29 | 9 | 10 |
| 9 | 0 | 20 | 19 | 0 | 20 | 4 | 3 | 2 | 16 | 12 | 13 |
| 6 | 2 | 0 | 26 | 1 | 22 | 2 | 2 | 2 | 27 | 13 | 14 |
| 39 | 3 | 22 | 155 | 0 | 6 | 34 | 3 | 17 | 206 | 9 | 11 |

### EXPLANATION.

In the first example, the column of pounds, when added up, makes 78, which contains two 28's, and 22 over; therefore set down 22 under the column of pounds, and carry 2 to the column of quarters, and so on.

## TROY WEIGHT.

By this weight are weighed jewels, gold, silver, pearls; and the usual denominations are pounds, ounces, pennyweights, and grains, as in the following table:—

*Table.*

| | | |
|---|---|---|
| 24 grains make | 1 pennyweight | *dwt.* |
| 20 pennyweights | 1 ounce | *oz.* |
| 12 ounces | 1 pound | *lb.* |

EXAMPLES.

| No. 1. | | | | No. 2. | | | | No. 3. | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *lb.* | *oz.* | *dwt.* | *gr.* | *lb.* | *oz.* | *dwt.* | *gr.* | *oz.* | *dwt.* | *gr.* |
| 4 | 5 | 12 | 10 | 14 | 6 | 10 | 11 | 204 | 10 | 14 |
| 5 | 4 | 16 | 17 | 24 | 10 | 11 | 12 | 96 | 7 | 17 |
| 3 | 11 | 19 | 20 | 21 | 6 | 4 | 17 | 100 | 11 | 12 |
| 4 | 6 | 7 | 12 | 22 | 10 | 12 | 14 | 56 | 16 | 20 |
| 5 | 1 | 11 | 12 | 16 | 11 | 12 | 13 | 212 | 10 | 23 |
| 4 | 11 | 12 | 13 | 22 | 7 | 6 | 17 | 96 | 19 | 12 |
| 28 | 6 | 0 | 12 | 123 | 4 | 18 | 12 | 767 | 17 | 2 |

*Note.*—That 1 *lb.* 2 *oz.* 11 *dwt.* 16 *grs*, troy is equal to a pound avoirdupois; and a pound troy is about 13 *oz.* 2½ *dr.* avoirdupois.

By the help of the following tables, the pupil will be enabled to perform operations in all other rules for weights and measures.

## TABLES.

*Apothecaries' Weight.*

| | |
|---|---|
| 20 grains (*grs.*) make | 1 scruple |
| 3 scruples | 1 drachm |
| 8 drachms | 1 ounce |
| 12 ounces | 1 pound |

By these weights apothecaries compound their medicines; but they buy and sell their drugs by avoirdupois weight.

### *Cloth Measure.*

| | | |
|---|---|---|
| | 2¼ | inches—1 nail |
| 4 nails or | 9 | inches—1 qr. of a yard |
| 4 qrs. or | 36 | inches—1 yard |
| 5 qrs. or | 45 | inches—1 ell English |
| 3 qrs. or | 27 | inches—1 ell Flemish |
| 6 qrs. or | 54 | inches—1 ell French. |

### *Wool Weight.*

| | |
|---|---|
| 7 lb. make 1 clove | 2 weys or 364 lb.—1 sack |
| 2 cloves or 14 lb.—1 stone | 12 sacks or 4368 lb.—1 last |
| 2 stones or 28 lb.—1 todd | 240 lb. 1 pack of wool. |
| 6½ todds or 182 lb.—1 wey | |

### *Wine Measure.*

| | |
|---|---|
| 2 pints, (*pt.*)—1 quart, (*qt.*) | 84 gallons—1 puncheon |
| 4 quarts—1 gallon, (*gall.*) | 2 hogsheads—1 pipe or butt |
| 42 gallons—1 tierce | 2 pipes, or 252 gallons—1 tun |
| 63 gallons—1 hogshead, (*hhd.*) | |

### *Ale and Beer Measure.*

| | |
|---|---|
| 2 pints—1 quart | 2 kilderkins, or 36 gallons—1 barrel |
| 4 quarts—1 gallon | 1 barrel and a half, or 54 gallons—1 hogshead |
| 9 gallons—1 firkin | |
| 2 firkins—1 kilderkin | |

A difference was formerly made between the ale and beer firkins, but latterly the distinction has been abandoned.

### *Dry Measure.*

| | |
|---|---|
| 2 pints—1 quart | 4 bushels—1 comb or half quarter |
| 2 quarts—1 pottle | 2 combs—1 quarter |
| 2 pottles—1 gallon | 5 quarters—1 wey |
| 2 gallons—1 peck | 2 weys, or 10 quarters—1 last |
| 4 pecks—1 bushel, land measure | 36 bushels—1 chaldron of coals |
| 5 pecks—1 bushel, water measure | |

By this measure, corn, salt, and other dry goods are measured.

Before the act for establishing uniformity in weights and measures came into operation, which was in January 1826,—

| | Inches. |
|---|---|
| The wine gallon contained - | 231 |
| The ale and beer gallon - - | 282 |
| The corn gallon - - - - | $268\frac{4}{5}$ |
| The standard bushel - - - | 2150 " 42 |

*Long Measure.*

3 barley-corns—1 inch
12 inches—1 foot
3 feet—1 yard
5 feet—1 geometrical pace
5 yards and a half—1 pole, perch, or rood
6 feet, or 2 yards—1 fathom
40 poles, or 220 yards—1 furlong
8 furlongs, or 1760 yards—1 mile
3 miles—1 league
60 geographical miles, or $69\frac{1}{2}$ English miles—1 degree

In a mile are 8 furlongs; 320 poles; 1760 yards; 5280 feet; 63,360 inches; 190,080 barley-corns.

*Land Measure.*

$5\frac{1}{2}$ yards—1 pole, perch, or rood
40 poles—1 rood, or quarter of an acre
160 poles in length and 1 in breadth—1 acre
80 poles in length and 2 in breadth—1 acre
40 poles in length and 4 in breadth—1 acre
4 poles in length—1 chain
10 chains in length and 1 in breadth—1 acre

*Time.*

60 seconds—1 minute
60 minutes—1 hour
24 hours—1 day
7 days—1 week
4 weeks—1 month
13 months, 1 day, and 6 hours—1 Julian year

In a year are 365 days 6 hours; 8766 hours; 525,960 minutes; 31,557,600 seconds.

The solar year is divided into 12 calendar months, which contain 365 days; and to know how many days are in each, observe attentively the following lines:—

Thirty days hath September,
April, June, and November;
February hath twenty-eight alone,
And all the rest have thirty-one.
Except when Leap-year doth combine,
Then February's days are twenty-nine.

### APPLICATION.

According to most chronologers, the world was created 4004 years before Christ; how old is it this present year, 1839?

*Answer,* 5843 years.

The inhabitants of our earth, excepting Noah and his family, were destroyed for their wickedness by a flood. This direful event is described in the 6th, 7th, and 8th chapters of Genesis; Noah being, as the sacred historian relates, "a just man and perfect in his generation, found grace in the eyes of the Lord," and was preserved in the ark, as were also his family, and a certain number of beasts and birds, to replenish the earth.

The Deluge happened 2356 years before Christ; how long is that ago, this present year, 1839?

*Answer,* 4195 years.

St. Paul's Cathedral cost £800,000; the Old Royal Exchange £80,000; the Mansion House £40,000; Blackfriars' Bridge £152,840; Westminster Bridge £389,000; and the Monument £13,000; what is the amount of these sums?

*Answer,* £1,474,840.

## COMPOUND SUBTRACTION.

Compound Subtraction teaches to find the difference between any two sums of various denominations.

*Rule.*—Place the numbers as before, so that the less may be below the greater; then subtract each denomination of the less from the same denomination of the greater, and set down each remainder below, in its proper place: but if either of the lower numbers be greater than the number immediately above it, increase the upper one by as many as make an unit of the next superior denomination, and subtract the lower from this sum; then carry one to the next lower number, and proceed as before.

## MONEY.

### EXAMPLES.

| No. 1. | | | No. 2. | | | No. 3. | | |
|---|---|---|---|---|---|---|---|---|
| £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* |
| 23 | 6 | 4 | 423 | 6 | 7 | 174 | 16 | $6\frac{1}{4}$ |
| 12 | 3 | $2\frac{1}{2}$ | 25 | 12 | 9 | 97 | 12 | $4\frac{3}{4}$ |
| 11 | 3 | $1\frac{1}{2}$ | 397 | 13 | 10 | 77 | 4 | $1\frac{1}{2}$ |

Thus, in No. 2, say 9 from 7 I cannot, but 9 from 19 (borrowing 12) and there remains 10: 1 that I borrowed and 12 are 13; 13 from 6 I cannot, but 13 from 26 (borrowing 20) and there remains 13: 1 that I borrowed and 5 are 6; 6 from 3 I cannot, but 6 from 13 (borrowing 10) and there remains 7: 1 that I borrowed and 2 are 3; 3 from 2 I cannot, but 3 from 12, and there remains 9: 1 that I borrowed from 4, and there remains 3. Prove it, as before, by addition.

## AVOIRDUPOIS WEIGHT.

| *T.* | *C.* | *qr.* | *lb.* | *C.* | *qr.* | *lb.* | *lb.* | *oz.* | *dr.* |
|---|---|---|---|---|---|---|---|---|---|
| 44 | 12 | 1 | 10 | 246 | 2 | 12 | 146 | 2 | 10 |
| 39 | 14 | 2 | 6 | 164 | 3 | 22 | 97 | 10 | 12 |
| 4 | 17 | 3 | 4 | 81 | 2 | 18 | 48 | 7 | 14 |

## TROY WEIGHT.

| *lb.* | *oz.* | *dwt.* | *gr.* | *lb.* | *oz.* | *dwt.* | *gr.* | *oz.* | *dwt.* | *gr.* |
|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 3 | 2 | 1 | 462 | 4 | 10 | 11 | 1247 | 10 | 13 |
| 14 | 5 | 1 | 1 | 196 | 9 | 6 | 16 | 975 | 16 | 17 |
| 1 | 10 | 1 | 0 | 265 | 7 | 3 | 19 | 271 | 13 | 20 |

### APPLICATION.

Runnymede, a place between Staines and Windsor, is reverenced by every son of liberty, as the spot where the liberties of Englishmen received a solemn confirmation. There the tyrant King John was compelled to sign the famous charter, which is now, by way of preeminence, called Magna Charta, and has generally been considered as the bulwark of English liberty.

"To make assurance doubly sure," the ratification of this charter has been reiterated no less than thirty several times.

This celebrated charter was wrested from John in 1215. How long has that happy event preceded 1840?

*Answer*, 625 years.

Richard I. of England defeated the French at Gisors in the department of Eure, and late province of Normandy, France, A.D. 1198. That monarch's parole for the day was, "*Dieu et mon droit*—God and my right," which has almost ever since continued the motto of the royal arms of England. How many years have intervened between that victory and the year 1840?

*Answer*, 642 years.

The prince of Orange, afterwards William III., landed at Torbay, in Devonshire, in 1688. He was invited over to England, to protect the country from the tyrannical oppressions of James II. This interesting event has been styled in the British history, the Glorious Revolution, and King William is much celebrated for his share in the transaction.

This Revolution took place in 1688. How long is that ago this present year, 1839?

*Answer*, 151 years.

Suppose the effects of a bankrupt amount to £500, and he owes to A, £300 19*s.* 6*d.*; to B, £519 7*s.* 6*d.*; to C, £218 14*s.* 5*d.*; and to D, £25 10*s.*; what is the deficiency?

*Answer*, £564 11*s.* 5*d.*

Suppose a merchant, commencing business with £10,000, gains £1,099 15*s.* 6*d.* in the course of a year, and at the expiration of that period distributes in charity the sum of £114 16*s.* 4*d.*; what is the balance remaining in hand?

*Answer*, £10,984 19*s.* 2*d.*

Post-chaises were invented by the French, and, according to Mr. Granger, introduced into England by Mr. William Tull, son of the well-known writer on husbandry. A sort of light open chaise, chariot, or calash, was, however, in use among the Romans, and said to have been invented by the Emperor Augustus, or Trajan.

If a post-chaise and pair of horses cost £120 10*s.* and the latter be valued at £52 12*s.* what is the price of the chaise?

*Answer*, £67 18*s.*

## COMPOUND MULTIPLICATION.

Compound Multiplication teaches to find the amount of any given number of different denominations, by repeating it any proposed number of times.

Case I.—When the multiplier does not exceed 12.

*Rule.*—Having placed the multiplier under the lowest denomination of the multiplicand, all the denominations of the latter are to be multiplied by it, observing to reduce the several denominations, and set down as in Compound Addition; and to add the number carried to the succeeding product, as in Simple Multiplication.

EXAMPLES.

| | No. 1. | | | No. 2. | | | No. 3. | | |
|---|---|---|---|---|---|---|---|---|---|
| | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* |
| Multiply | 7 | 12 | 6 | 8 | 13 | 4 | 15 | 5 | 4 |
| By . . . . | | | 6 | | | 9 | | | 12 |
| | 45 | 15 | 0 | 78 | 0 | 0 | 183 | 4 | 0 |

Here, in No. 1, say, 6 times 6 are 36 pence, which are just 3*s.*; set down 0 in the place of pence, and carry 3 to the place of shillings (exactly the same as in Addition of Money); then 6 times 12 are 72, and 3 are 75, or £3 15*s.*; set down 15 in the place of shillings, and carry 3 to the pounds: then 6 times 7 are 42, and 3 are 45. So the whole amount is £45 15*s.*

Case II.—When the given quantity exceeds 12, and is such a number that any two numbers in the Multiplication Table being multiplied together will produce it.

*Rule.*—Multiply the given sum by one of these numbers, and the product by the other.

EXAMPLES.

No. 1.

| | *s.* | *d.* | |
|---|---|---|---|
| 30 ells of Holland, at | 3 | 7 | per ell. |
| | | 10 | |
| | 1 | 15 | 10 |
| | | 3 | |
| | £5 | 7 | 6 |

No. 2.

| | s. | d. |
|---|---|---|
| 45 lbs. of raw silk, at | 15 | 4 per lb. |
| | | 5 |
| | 3 16 | 8 |
| | | 9 |
| | £34 10 | 0 |

Case III.—When the given quantity cannot be produced by the multiplication of two small numbers.

*Rule.*—Find the two figures which come the nearest to it, and multiply by them as before: then multiply the original sum by whatever number remains, and add it to the last product, and the total will be the answer.

EXAMPLES.

No. 1.

| | £ | s. | |
|---|---|---|---|
| 79 cwt. of cheese, at | 1 | 8 | (by 2.) |
| Multiply by | | 7 | |
| | 9 | 16 | |
| And | | 11 | |
| | 107 | 16 | |
| | 2 | 16 | |
| | £110 | 12 | |

No. 2.

| | £ | s. | d. | |
|---|---|---|---|---|
| 113 cwt of hops, at | 4 | 10 | 6 | (by 3.) |
| | | | 10 | |
| | 45 | 5 | 0 | |
| | | | 11 | |
| | 497 | 15 | 0 | |
| | 13 | 11 | 6 | |
| | £511 | 6 | 6 | |

APPLICATION.

Cork is the bark of a tree of the same name, a species of the oak. It grows in great abundance on the Pyrenean mountains, and in other parts of Spain; in France; and in the north of New England. The Egyptians made coffins of cork, which, being lined with a resinous composition, preserved dead bodies uncorrupted. But the chief use of cork in this country is to stop bottles.

What are five gross of corks worth, at 3*s.* 9¾*d.* per gross?

*Answer,* 19*s.* 0¾*d.*

Cotton is a plant, or shrub, of which there are several varieties, and not a few distinct species, propagated in the gardens of the curious among us. It makes a very considerable article of commerce; being used for various purposes, and furnishing various cloths, muslins, calicoes, dimities, and hangings; besides that, it is frequently joined with silk and flax, in the composition of their stuffs.

What are 80 lbs. of cotton worth, at 2*s.* 8½*d* per lb.?

*Answer,* £10 16*s.* 8*d.*

Musk is a dry, light, and friable substance, of a dark blackish colour, feeling somewhat smooth, or unctuous. It is brought from the East Indies, chiefly from the kingdom of Bantam, in the island of Java. The animal which produces it is of a very singular kind, not agreeing with any established genus: it is of the size of a common goat, but taller. The bag which contains the musk is situated under the creature's belly, and is about the size of a hen's egg.

What are 95½ ounces of musk worth, at £2 2*s.* 3*d.* per ounce?

*Answer,* £201 14*s.* 10½*d.*

Watches were first made in the seventeenth century, and the glory of this excellent invention lies between Dr. Hooke and Mr. Huygens, but to which of them it properly belongs has been much disputed; the English ascribing it to the former; and the Dutch, French, &c. to the latter. Hume, however, in his History of England, asserts, that pocket-watches were first brought into England from Germany, about the year 1577, having been invented at Nuremberg.

What are 549 common silver watches worth, at £4 18*s.* 6*d.* per watch?

*Answer,* £2703 16*s.* 6*d.*

## COMPOUND DIVISION.

This rule teaches to divide a compound number by a simple one.

Case I.—When the divisor does not exceed 12.

*Rule.*—Place the divisor and dividend as in simple numbers, and proceed with the pounds in the same manner: if there be any remainder, bring it into shillings by multiplying by 20, and add that amount to the shillings in the dividend; if not, divide them without it; and so, by every denomination, bringing each remainder, if any, into the succeeding denomination, and dividing as before.

EXAMPLES.

| | No. 1. | | | No. 2. | | | No. 3. | | |
|---|---|---|---|---|---|---|---|---|---|
| | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* |
| Divisor . . | 5 ) 26 | 12 | 6 | 12 ) 246 | 13 | 6 | 11 ) 531 | 8 | 2 |
| Quotient . | 5 | 6 | 6 | 20 | 11 | $1\frac{1}{2}$ | 48 | 6 | $2\frac{4}{11}$ |
| | | | 5 | | | 12 | | | 11 |
| Proof . . . | 26 | 12 | 6 | 246 | 13 | 6 | 531 | 8 | 2 |

In the foregoing example, No. 1, say, 5's in 26, 5 times and 1 over, that is, £1 or 20*s.*, which, with the 12 in the place of shillings, make 32*s.*; then 5's in 32, 6 times, and there remains 2*s.* or 24*d.*, which, with 6 in the place of pence, make 30; then 5's in 30, 6 times.

Case II.—When the divisor exceeds 12, and is such a number that two figures multiplied together will produce it, the work may be performed by two divisors, thus:—

EXAMPLES.

No. 1.

Divide £463 18*s.* 6*d.* into 18 equal parts.

| | £ | *s.* | *d.* |
|---|---|---|---|
| 3 ) | 463 | 18 | 6 |
| 6 ) | 154 | 12 | 10 |
| *Answer* | £25 | 15 | $5\frac{4}{6}$ |

No. 2.

If 84lb. of coffee cost £31 10*s.* what will 1 lb. cost?

| | £ | *s.* | *d.* |
|---|---|---|---|
| 7) | 31 | 10 | 0 |
| 12) | 4 | 10 | 0 |
| *Answer* | | 7 | 6 |

By Division of Money, if the amount of several articles is known, the price of one at the same rate may be found as well as by the Rule of Three (see Example No. 2); and as in Multiplication of Money the price is multiplied by the quantity, so in Division of Money the price is divided by the quantity, to obtain an answer.

APPLICATION.

Mathematicians have demonstrated that light moves with such amazing rapidity, as to pass from the sun to our planet in about the space of eight minutes. Now, admitting the distance, as usually computed, to be 95,000,000 of English miles, at what rate per minute does it travel?

*Answer*, 11,875,000 miles.

Longitude is the distance of a place from some first meridian, east or west, measured in degrees and minutes (60 of which make a degree) on the equator, half the circumference of the globe, or 180 degrees. Longitude may also be reckoned by time: for the circumference of the earth being 360 degrees, and its diurnal revolution performed in 24 hours, it follows, that 1 hour of time is equal to 15 degrees of longitude; and so in proportion for any greater or less quantity: consequently, a place which has the sun 1, 2, or 3 hours before or after another place, must be situated 15, 30, or 45 degrees east or west of the meridian of such a place. Hence, dividing the longitude of any place by 15, will give the number of hours that place has the sun before or after persons who live under the first meridian.

Petersburgh, the capital of the Russian empire, built by Peter the Great—and Constantinople, the chief city of the Ottoman empire, rebuilt by Constantine the Great—are situated in about 30 degrees of eastern longitude from the meridian of London. What is the hour at those places when it is noon with us?

*Answer*, 2 o'clock in the afternoon.

The circumference of our earth under the equator is 21,600 geographical, or 25,020 English miles; now this body turning on its axis in about 24 hours, at what rate an hour, English measure, are the inhabitants situated under the equator carried from west to east by the rotation?

*Answer*, 1042½ miles.

The velocity of the parts of the earth near the equator greatly exceeds the rapidity of motion of the parts in latitude approaching the poles, as will be evident by the bare inspection of a terrestrial globe. In the parallel of latitude in which London is situated, a degree of longitude is only about 37 geographical, or 42 English miles. Consequently, the circumference of the globe in this parallel is but about 15,120 English miles. At what rate per hour are we carried by the earth's diurnal rotation?

*Answer*, 630 miles.

Lottery is a kind of public game at hazard, used in England, France, and Holland, in order to raise money for the service of the state, and appointed with us by act of parliament. The first lottery in England of which we have any account, was drawn at the west door of St. Paul's cathedral in 1569, and consisted of 40,000 lots, at 40*s.* each. The prizes were plate, and the profits were to be applied towards repairing the havens of this kingdom. In 1612, King James, for the plantation of English colonies in Virginia, appointed a lottery at the place where the one just mentioned had been determined. The principal prize of this last was 4000 crowns in fair plate.

In the state lottery of the year 1787, one of the £20,000 prizes came to a club consisting of 35 clerks in the India House. To how much did the share of each amount?

*Answer*, £571 8*s.* 6¾*d.*

Posts, in their present improved state, are of very modern invention; for, even in France, the first place of their adoption, they were, in 1619, still unprovided with a letter-office. The year 1635, during Charles the First's reign, presents the first regular establishment of the kind in England. A private person projected, in 1683, the useful conveyance of letters and small parcels, by the penny post, throughout London and its suburbs. The annual gross amount of our foreign and inland post-offices, so far back as the year 1764, was stated to be £432,048. What was the quarterly, monthly, and weekly income at that period?

*Answer*, £108,012, quarterly; £36,004 monthly; £8,308 12*s.* 3½*d.*, weekly.

## COMPOUND REDUCTION.

In Simple Reduction the pupil was only required to reduce one denomination to the next lower, or next higher denomination; but in this he will be required to reduce quantities of the highest denomination to those of the lowest, and the contrary. This is not, properly speaking, a distinct rule in Arithmetic, but rather the application of the two preceding ones; for all great names are brought into small by multiplication, and all small ones into great by division.

Case I.—To bring numbers from a higher to a lower denomination.

*Rule.*—Multiply the given number by the number denoting how many of the lower denomination make one of the higher.

Thus: to bring pounds into shillings, multiply the pounds by 20; to bring shillings into pence, multiply the shillings by 12; and to bring pence into farthings, multiply the pence by 4, &c. This is sometimes called Reduction Descending.

Case II.—To bring numbers from a lower denomination into a higher.

*Rule.*—Divide by the number denoting how many of the lower denomination are contained in one of the higher.

Thus: to bring farthings into pence, divide by 4; to bring pence into shillings, divide by 12; and to bring shillings into pounds, divide by 20. This is sometimes called Reduction Ascending.

### EXAMPLES.

In £32 14*s.* 6¾*d.* how many farthings?

No. 1.

*Of Money Ascending.*

| £ | *s.* | *d.* |
|---|---|---|
| 32 | 14 | 6¾ |
| 20 | | |
| 654 shillings. | | |
| 12 | | |
| 7854 pence. | | |
| 4 | | |

*Ans.* 31419 farthings.

No. 2.

*Of Money Descending.*

Proved thus:—

4 ) 31419 farthings.
12 ) 7854 ¾
2,0 ) 65,4 6*d.*
32 14*s.*
*Ans.* £32 14 6¾*d.*

EXPLANATION.

In the first of these examples, begin to multiply by 20, because 20 shillings make one pound; but as it contains a cipher on the right hand, take the 4 from the 14 shillings, and set it down in its proper place; then multiply by the 2, saying twice 2 are 4, and 1 from the 14 which was left are 5; and twice 3 are 6: then multiply the 654 shillings by 12, because 12 pence make one shilling, adding the 6 from the pence to the first figure multiplied: and lastly, multiply the 7854 pence by 4, because 4 farthings make one penny, adding the 3 farthings to the first figure multiplied.

In the second example, the sum is proved by division, which is the way to ascertain any similar sum: here you begin by dividing the 31419 farthings by 4, in order to bring them into pence; thus, 4's in 31, 7 times, and 3 over; 4's in 34, 8 times, and 2 over; 4's in 21, 5 times, and 1 over; 4's in 19, 4 times, and 3 over, which are $\frac{3}{4}$ths of a penny: and therefore you find that in 31419 farthings, are contained 7854 pence and 3 farthings; thus you proceed through the whole, dividing the pence by 12 to bring them into shillings, and the shillings by 20 to bring them into pounds, taking care to carry out the remainder, which must be brought down when the answer is given.

Pounds may be brought into pence at once by multiplying by 240; or into farthings by multiplying by 960; and on the contrary, farthings and pence may be brought at once into pounds by dividing by the same numbers.

To reduce foreign or English coin into pounds sterling, multiply the given number of pieces by the shillings, pence, and farthings that are in one piece, and the product will be of the same name; which bring into pounds sterling by division.

It has already been stated, that all great names are brought into small by multiplication; and all small ones into great by division; and as this observation will apply to the reduction of all kinds of weights and measures, an example or two shall suffice without further directions.

EXAMPLES.

In 456 *C.* 3 *qr.* 27 *lb.* of copper how many pounds?

| *C.* | *qr.* | *lb.* |
|---|---|---|
| 456 | 3 | 27 |
| 4 | | |
| 1827 | | |
| 28 | | |
| 14623 | | |
| 3656 | | |

*Answer* 51183 *lb.*

In 47,964 grains how many pounds troy?

*grs.*
24 ) 47964 ( 1998 *dwt.*
24

239
216

236
216

204
192

12 *grs.*

| *dwt.* | |
|---|---|
| 2,0 ) 199,8 | |
| 12 ) 99 | 18 *dwt.* |
| | 8 *lb.* 3 *oz.* |

*Answer*, 8 *lb.* 3 *oz.* 18 *dwt.* 12 *gr.*

APPLICATION.

Handel's first Commemoration at Westminster Abbey, in 1784, is said to have yielded £12,746. How many crowns, half-crowns, pence, and farthings, are in that sum?

*Answer*, 50,984 crowns; 101,968 half-crowns; 3,059,040 pence; 12,236,160 farthings.

Westminster Bridge is reckoned one of the most complete and elegant structures of the kind in the known world. It was begun

in 1738, and finished 1750, at the expense of £218,800, defrayed by the parliament.

Blackfriars' Bridge, though now gone to decay, and under repair, was originally a very fine bridge, and its architecture has been spoken of in terms of high commendation. It commands a fine view of the Thames, and discovers the majesty of St. Paul's in a very striking manner. It was begun in 1760, and completed in 10 years and three quarters, at the expense of £152,840 sterling, which was discharged by a toll upon the passengers.

How many farthings are in the amount of the sum expended in building the above-mentioned two bridges; and how many half-crowns, sixpences, pence, and farthings, are in their difference?

*Answer*, 356,774,400 farthings, in the whole; 527,680 half-crowns; 2,638,400 sixpences; 15,830,400 pence; and 63,321,600 farthings in the difference.

The celebrated Colossus of Rhodes, deemed one of the wonders of the world, was a statue of brass, erected to the *Sun*, at the mouth of the harbour of Rhodes, a city in an island of the same name, in the Mediterranean Sea. It was 105 feet high, and proportioned in all its parts; and according to the general opinion, the ships of that period passed between its legs.

Chares, of Lindus, devoted 12 years to the completion of the work, which occurred 288 years B.C. Sixty-six years subsequent to its erection, an earthquake overthrew it, and it lay neglected 894 years, that is, till the year of our Lord 672; when Moarvias, the sixth caliph or emperor of the Saracens, having taken Rhodes, sold the brass of this famous statue to a Jewish merchant, who loaded 900 camels with it. Allowing only 800*lb.* weight to every camel, (though some will carry 1200 or 1300*lb.*) how many tons did the Colossus weigh?

*Answer*, 321*T.* 8*C.* 2*qr.* 8*lb.*

The invention of bells is by some attributed to the Egyptians, and they were anciently known among the Persians, the Greeks, and the Romans.

There are several bells of great magnitude in England; particularly Tom of Lincoln, weighing 11,200 pounds; Peter of Exeter, weighing 12,500 pounds; and "Mighty Tom" of Christ-Church, Oxford, weighing 17,000 pounds. But the largest bell in the known world is that of Moscow, the ancient capital of the Russian empire, of which a very particular and interesting account is given by Dr. Clarke of Cambridge, in the first volume of his Travels. Its height is 19 feet, its circumference at the bottom

63 feet 11 inches, its greatest thickness 23 inches, and its weight 432,000 pounds. How many tons, &c. do each of these bells weigh?

*Answer*, The great bell at Lincoln, 5*T.*; at Exeter, 5*T.* 11*C.* 2*qr.* 12*lb.*; at Oxford, 7*T.* 11*C.* 3*qr.* 4*lb.*; and at Moscow, 192*T.* 17*C.* 16*lb.*

## THE RULE OF THREE DIRECT.

The Rule of Three Direct teaches by three numbers given to find a fourth, in such proportion to the third as the second is to the first; for which reason it is termed the Rule of Proportion; it is also called the Rule of Three, from its having three numbers given; and because of its extensive use in arithmetic, it is often called the Golden Rule.

*Rule.*—State the question by placing the given numbers in such order that the first and third terms be of the same kind; and the second of the same with the fourth term, or the answer required, (see Example No. 1.)

If the first and third terms be of different denominations, reduce them into one; and if the second be of more denominations than one, as for instance, pounds, shillings, &c. reduce it into the lowest name mentioned, (see Example No. 2.)

Multiply the second and third terms together, and divide that product by the first, and the quotient will be the answer, in the same denomination with the second term; but if after the division there be a remainder, reduce it into the next denomination below, and divide by the same divisor, and the quotient will be so many of the next name, and so on. The method of proof is by inverting the question.

### EXAMPLES.

No. 1.

If 50*lb.* of indigo cost £10, what will 1008*lb.* cost?

| | *lb.* | | £ | | *lb.* |
|---|---|---|---|---|---|
| If | 50 | : | 10 | :: | 1008 |
| | | | | | 10 |
| | | | | | 5,0 ) 1008,0 |
| | | | | | *Ans.* £201 12*s.* |

No. 2.

If 4*C.* 3*qr.* of sugar cost £5 15*s.* 7*d.* what will 4 hogsheads come to, weighing 42*C.* 1*qr.* 14*lb.*?

| *C.* | *qr.* | | £ | *s.* | *d.* | | *C.* | *qr.* | *lb.* |
|---|---|---|---|---|---|---|---|---|---|
| If 4 | 3 | : | 5 | 15 | 7 | :: | 42 | 1 | 14 |
| 4 | | | 20 | | | | 4 | | |
| 19 | | | 115 | | | | 169 | | |
| 28 | | | 12 | | | | 28 | | |
| 152 | | | 1387 pence. | | | | 1366 | | |
| 38 | | | | | | | 338 | | |
| 532 *lb.* | | | | | | | 4746 *lb.* | | |
| | | | | | | | 1387 | | |
| | | | | | | | 33222 | | |
| | | | | | | | 37968 | | |
| | | | | | | | 14238 | | |
| | | | | | | | 4746 | | |
| | | | | | | | 532 ) 6582702 ( 12373 pence. | | |
| | | | | | | | 532 | | |
| | | | | | | | 1262 | 12 ) 12373½ | |
| | | | | | | | 1064 | | |
| | | | | | | | 1987 | 2,0 ) 103,1 1*d.* | |
| | | | | | | | 1596 | *Ans.* £51 11*s.* 1½*d.* | |
| | | | | | | | 3910 | | |
| | | | | | | | 3724 | | |
| | | | | | | | 1862 | | |
| | | | | | | | 1596 | | |
| | | | | | | | 266 | | |
| | | | | | | | 4 | | |
| | | | | | | | 532 ) 1064 ( 2 farthings. | | |
| | | | | | | | 1064 | | |
| | | | | | | | .... | | |

12,373 pence 2 farthings, reduced into pounds, &c. will give the above answer, £51 11*s.* 1½*d.*

APPLICATION.

Mead is a wholesome, agreeable liquor, prepared of honey and water. It is a liquor of very ancient use in Britain, and some persons deem the best sort scarcely inferior to foreign wines. It is thought probable, that before the introduction of agriculture into our island, mead was the only strong liquor known to its inhabitants; and it continued to be a favourite beverage among them and their posterity, long after they had become acquainted with other liquors.

If two gallons of mead be worth 4*s.* 9½*d.* what is the value of a hogshead, wine measure?

*Answer*, £7 10*s.* 11½*d.*

Metheglin is a species of mead, prepared from honey boiled with water and fermented, and one of the most pleasant and general drinks the northern parts of Europe afford, and was much used among the ancient inhabitants.

From the custom of drinking a beverage made with honey for thirty days' feast after a grand wedding, comes the expression 'honey-moon,' which is a phrase used by the Teutones, who were an ancient people that inhabited the northern parts of Germany. Attila, king of Hungary, celebrated for the horrible ravages that he committed both in Gaul and Italy, drank so freely of hydromel (a sort of mead or metheglin, as the word imports) on his wedding-day, that he was found suffocated at night; an event which occurred A. D. 453; and with him expired the empire of the Huns.

If a hogshead of metheglin, wine measure, be worth £7 10*s.* 11¼*d.* what is the value of two gallons?

*Answer*, 4*s.* 9½*d.*

Glass is a transparent, solid, brittle, factitious body, produced from a species of salt and sand, or stone, by the action of fire.

The discovery of glass, according to Pliny, took place by accident, in Syria, at the mouth of the river Belus, by certain merchants driven thither by the fortune of the sea. Being obliged to live there, and dress their victuals by making a fire on the ground, and plenty of the plant kali being on the spot, this herb being burnt to ashes, and the sand or stones of the place accidentally mixing with it, a vitrification was undesignedly made; from whence the hint was taken, and easily improved.

The glass manufacture was first begun in England, in 1557, in London; improved in 1635; and brought to a great degree of perfection in the reign of King William III. But the first glass

plates, for looking-glasses and coach-windows, were made in 1673, at Lambeth.

If 1728 elegant wine glasses were bought for £65 2*s*. how must they be sold per dozen, or per glass, to gain ten guineas by the sale of the whole?

*Answer*, 10*s*. 6*d*. per dozen; or 10½*d*. per glass.

## THE RULE OF THREE INVERSE.

The Rule of Three Inverse, or, as it is often called, of Indirect Proportion, is used, when of four numbers the third bears the same proportion to the first as the second does to the fourth; therefore, the less the third term is in respect to the first, the greater will the fourth be in respect to the second.

*Rule.*—State the question inversely; reduce the terms as in the Rule of Three Direct. Multiply the first and second terms together, and divide their product by the third, and the quotient will be the answer.

### EXAMPLES.

No. 1.

If a board be 9 inches broad, how much in length will make a square foot?

| | *in. b.* | | *in. l.* | | *in. b.* |
|---|---|---|---|---|---|
| If | 12 | : | 12 | :: | 9 |
| | | | 12 | | |
| | | | 9 ) 144 | | |

*Answer*, 16 inches in length.

No. 2.

How many yards of sarcenet, of 3*qr*. wide, will line 9 yards of cloth of 8*qr*. wide?

| | *qr. w.* | | *qr. l.* | | *qr. w.* |
|---|---|---|---|---|---|
| If | 8 | : | 9 | :: | 3 |
| | | | 8 | | |
| | | | 3 ) 72 | | |

*Answer*, 24 yards.

To know when the question belongs to the direct, and when to the indirect or inverse rule, consider whether the answer to the question ought to be more or less than the second number: if more, then the lesser of the first and third numbers must be the divisor; but if less, then the greater of the first and third numbers must be the divisor.

### APPLICATION.

If a person lend another the sum of £200 for 12 months, how many months should the latter lend the former £150, to requite the obligation?

*Answer*, 16 months.

How many yards of matting, 2 feet 6 inches wide, will cover a floor that is 27 feet long and 20 feet broad?

*Answer*, 72 yards.

The carpet manufacture is said to have been introduced into France from Persia, in the reign of Henry IV. The art was brought to London in 1750, by two men who quitted France in disgust, and came here to procure employment. We have manufactories for carpets that are much esteemed, at Axminster, Wilton, Kidderminster, and other places.

How many yards of carpeting, 3*qr.* broad, will cover a room which is 3 yards in length and 4 in breadth?

*Answer*, 16 yards.

## COMPOUND PROPORTION, OR THE RULE OF FIVE.

Compound Proportion teaches to resolve such questions as require two or more statings by simple proportion, and that whether they are direct or inverse.

This is called the Rule of Five, from its having five numbers or terms given to find a sixth.

If the proportion be direct, the sixth term must bear such a proportion to the fourth and fifth, as the third bears to the first and second; but if the proportion be inverse, the sixth must bear such proportion to the fourth and fifth, as the first bears to the second and third.

*Rule.*—In placing the three first terms, let the principal cause of gain, loss, or action, &c. be put first; that which denotes time, distance, &c. second; and the remaining one in the third. Then, in order to find whether the proportion be direct or inverse, place the two other terms which move the question underneath those of the same name; if the blank fall under the third term, the proportion is direct; if under the first or second, it is inverse.

In Direct Proportion, multiply the two first terms together for a divisor, and the three last for a dividend (see Example No 1.) In Inverse Proportion, multiply the third and fourth terms together for a divisor, and the other three for a dividend, (see Example No. 2,) and the quotients in each case will be the answer.

*Note.*—Every question in each part of this rule may be proved by two statements in the Rule of Three.

### EXAMPLES.

#### No. 1.

If £100 principal in 12 months gain £5 interest, what will £246 gain in 7 months?

| £ *pr.* | | *mo.* | | £ *int.* | | £ | | *mo.* |
|---|---|---|---|---|---|---|---|---|
| 100 | : | 12 | :: | 5 | : | 246 | :: | 7 |
| 12 | | | | | | 7 | | |
| 1200 | | | | | | 1722 | | |
| | | | | | | 5 | | |

1200 ) 8610 ( £7
8400

210
20

1200 ) 4200 ( 3*s.*
3600

600
12

1200 ) 7200 ( 6*d.*
7200

....

*Answer*, £7 3*s.* 6*d.*

No. 2.

If £100 principal in 12 months gain £6 interest, what principal will gain £20 interest in 8 months?

| £ *pr.* | | *mo.* | | £ *int.* | | *mo.* | | £ *int.* |
|---|---|---|---|---|---|---|---|---|
| 100 | : | 12 | :: | 6 | : | 8 | :: | 20 |
| 12 | | | | | | 6 | | |
| 1200 | | | | | | 48 the divisor. | | |
| 20 | | | | | | | | |

48 ) 24000 ( £500 principal.
24000

.....

*Answer*, £500 principal.

APPLICATION.

The chief pilchard fisheries are along the coasts of Dalmatia, in the Gulf of Venice; on the coasts of France, between Belle-Isle and Brest; and along the shores of Cornwall and Devonshire.

In 1767, there were at one time enclosed in St. Ive's Bay, Cornwall, 7000 hogsheads, each containing 35,000 fish; in all, 245,000,000. The cash paid annually, on an average of ten years, for pilchards exported from Cornwall, amounted to £49,325 10*s*.

Suppose 6 men could barrel up 24 hogsheads of pilchards in 2 days, how many days would 100 men require to fill the number of hogsheads above mentioned?

*Answer*, 35 days.

The great colony of herrings, we are told, sets out from the Icy Sea about the middle of winter, composed of such numbers as exceed all powers of imagination. The main body begins in a certain latitude to separate into two grand divisions, one of which moves westward, and pours down the coasts of America; the other division takes a more eastern direction, and falls in with the great island of Iceland, about the beginning of March. The Shetland Isles oblige them again to divide into two shoals, which shape their course along the eastern and western coasts of the British Isles; and the last are observed to be much larger and fatter, as well as considerably more abundant, than those on the

east side. The immediate cause of their migration is supposed to be their strong desire to remove to warmer seas, for the sake of depositing their spawn, where it will vivify with more certainty than under the frigid zone.

Loch Fyne, Scotland, being one of the favourite haunts of the herring, at certain seasons of the year is frequented by innumerable shoals, insomuch that the lake is said to contain one part water and two parts fish. In a single bay of this lake above 600 boats are sometimes employed in taking them. Each of these vessels clears on an average annually from £40 to £50, according to Dr. Garnett, who adds, that 20,000 barrels, each on a medium containing 700 herrings, have been caught and cured in one season in Loch Fyne.

If two boats could take four thousand herrings in six days, how many weeks (exclusive of Sundays) would the number of boats mentioned above require to take the entire quantity of fish specified by Dr. Garnett?

*Answer*, 11 weeks 4 days.

A steam-engine is a machine that derives its moving power from the elasticity and condensibility of the steam of boiling water. It is allowed to be the most valuable present that the arts of life have ever received from the philosopher.

To such an amazing perfection has this machine at length been brought, that the consumption of one bushel of good pit-coal will enable it to raise 6000 hogsheads of water ten feet high, or to do the work of ten horses for one hour. Upon this supposition, how many gallons of this liquid would 144 pecks of coal raise to a similar height?

*Answer*, 13,608,000 gallons.

## PRACTICE.

This rule is so called, from its frequent use and brevity in casting up all sorts of goods or merchandise.

It is performed by taking what are called aliquot or even parts of the different denominations; by which means many tedious reductions may be avoided. It would be an endless task to introduce all the easy methods of operation, but the general rules are all given with examples to illustrate them.

All questions in the Rule of Three, where the first number in the statement is 1, may be performed by this rule; but it is necessary first to learn the following tables by heart:—

## *Tables.*

Parts of a Shilling.

| *d.* | | |
|---|---|---|
| 1 | is | $\frac{1}{12}$ |
| $1\frac{1}{2}$ | — | $\frac{1}{8}$ |
| 2 | — | $\frac{1}{6}$ |
| 3 | — | $\frac{1}{4}$ |
| 4 | — | $\frac{1}{3}$ |
| 6 | — | $\frac{1}{2}$ |

Parts of a Pound.

| *s.* | *d.* | | |
|---|---|---|---|
| 1 | 0 | is | $\frac{1}{20}$ |
| 1 | 8 | — | $\frac{1}{12}$ |
| 2 | 0 | — | $\frac{1}{10}$ |
| 2 | 6 | — | $\frac{1}{8}$ |
| 3 | 4 | — | $\frac{1}{6}$ |
| 4 | 0 | — | $\frac{1}{5}$ |
| 5 | 0 | — | $\frac{1}{4}$ |
| 6 | 8 | — | $\frac{1}{3}$ |
| 10 | 0 | — | $\frac{1}{2}$ |

CASE I.—When the price is less than a penny, divide by the aliquot parts that are in a penny; then by 12 and 20, which will give the answer.

### EXAMPLE.

2106 pounds of iron at $\frac{1}{2}d.$ per pound.

*lbs.*

$\frac{1}{2}d.$ is $\frac{1}{2}$—2 ) 2106

12 ) 1053

2,0 ) 8,7 9*d.*

*Answer*, £4 7*s.* 9*d.*

CASE II.—When the price is less than a shilling, divide by the aliquot parts that are in a shilling; add them together, and it will give the answer in shillings, which divide by 20, as before.

EXAMPLE.

246 yards of riband at 3*d.* per yard.

*yds.*
3*d.* is $\frac{1}{4}$—4 ) 246

2,0 ) 6,1 6*d.*

*Answer*, £3 1*s.* 6*d.*

Case III.—When the price is more than a shilling, but less than two, set the given quantity down as so many shillings, but draw no line under it; then take the aliquot parts of so much of the price as is more than a shilling, as in the last rule; add all the amounts together, and the sum will be the answer in shillings.

EXAMPLE.

6806 pounds of sugar at 1*s.* 3$\frac{1}{2}$*d.* per pound.

*lbs.*
3*d.* is $\frac{1}{4}$—4 ) 6806
$\frac{1}{2}$*d.* is $\frac{1}{6}$ of 3*d.*—6 ) 1701 6*d.*
283 7*d.*

2,0 ) 879,1 1*d.*

*Answer*, £439 11*s.* 1*d.*

Case IV.—When the price is any even number of shillings less than 20, multiply the given quantity by half the price, doubling the first figure of the product and calling it shillings; the rest of the product will be pounds.

EXAMPLES.

No. 1.

2476*lbs.* of tea at 8*s.* per *lb.*

*lbs.*
2476
4

*Answer*, £990 8*s.*

No. 2.

2967 yds. of cloth at 14*s.* per yd.

*yds.*
2967
7

*Answer*, £2076 18*s.*

CASE V.—When the price is any odd number of shillings under 20, multiply the given quantity by the price, and the product will be the answer in shillings.

EXAMPLE.

4962 gallons of spirits at 19*s.* per gallon.

| | |
|---|---|
| | *gal.* |
| | 4962 |
| | 19 |
| 2,0 ) | 9427,8 |
| *Answer,* | £4713 18*s.* |

CASE VI.—When the price is shillings, or shillings and pence, and they are an aliquot part of a pound, divide by the aliquot part, and the quotient will be the answer in pounds.

EXAMPLE.

254 yards of cloth at 10*s.* per yard.

| | |
|---|---|
| | *yds.* |
| 10*s.* is ½—2 ) | 254 |
| *Answer,* | £127 |

CASE VII.—When the price is shillings and pence, and they are not an aliquot part of a pound, multiply the given quantity by the shillings, and take parts for the pence, &c.; add them together, and the sum will be the answer in shillings.

EXAMPLE.

427 yards of Irish, at 5*s.* 9*d.* per yard.

| | | |
|---|---|---|
| | *yds.* | |
| 6*d.* is ½—2 ) | 427 | |
| | 5 | |
| | 2135 | |
| 3*d.* is ½ of 6*d.*—2 ) | 213 | 6*d.* |
| | 106 | 9*d.* |
| 2,0 ) | 245,5 | 3*d.* |
| | £122 15*s.* 3*d.* | *Answer.* |

CASE VIII.—When the given price is pounds and shillings, multiply the quantity by the pounds, and proceed with the shillings, if they are even, as in Case IV. (see the following example); but if odd, take aliquot parts, add them together, and the sum will be the answer.

EXAMPLE.

649 pieces of Irish, at £4 6*s.* per piece.

| *pieces.* | | *pieces.* |
|---|---|---|
| 649 | | 649 |
| 4 | | 3 |
| 2596 | | £194 14*s.* |
| 194 14*s.* | | |
| £2790 14*s.* | *Answer.* | |

CASE IX.—When the price is pounds, shillings, and pence, and the shillings and pence are an aliquot part of a pound, multiply the given quantity by the pounds, as in the last case; and take parts for the shillings and pence, as in Cases VI. and VII.; add them together, and the sum will be the answer.

EXAMPLE.

274 pieces of Irish, at £7 6*s.* 8*d.* per piece.

| | *pieces.* | |
|---|---|---|
| 6*s.* 8*d.* is $\frac{1}{3}$—3 ) | 274 | |
| | 7 | |
| | 1918 | |
| | 91 | 6*s.* 8*d.* |
| | £2009 | 6*s.* 8*d.* *Answer.* |

CASE X.—When the price is pounds, shillings, pence, and farthings, and the shillings and pence are not an aliquot part of a pound, reduce the pounds and shillings into shillings; multiply the given quantity by the shillings, as in Case VII.; take parts for the pence and farthings, as in Case II.

EXAMPLE.

279 pieces of muslin, at £6 11*s*. 9½ per piece.

| £ *s*. | *pieces*. |
|---|---|
| 6 11 | 6*d*. is ½—2 ) 279 |
| 20 | 131 |
| 131*s*. | 279 |
| | 837 |
| | 279 |
| | 36549 |
| 3*d*. is ½ of 6*d*.—2 ) | 139 6*d*. |
| ½*d*. is ⅙ of 3*d*.—6 ) | 69 2 |
| | 11 7½ |
| 2,0 ) | 3676,9 10½ |
| *Answer*, | £1838 9*s*. 10½*d*. |

The following are the principal signs or characters used as abbreviations in the subsequent rules of arithmetic:—

| | | | |
|---|---|---|---|
| + plus or more, | the sign of | addition, | as 6 + 2 is 8. |
| — minus or less, | ,, | subtraction, | as 6 — 2 is 4. |
| × multiplied by, | ,, | multiplication, | as 6 × 2 is 12. |
| ÷ divide by, | ,, | division, | as 6 ÷ 2 is 3. |
| = equal to, | ,, | equality, | as 6 + 2 = 8. |
| : is to<br>:: so is | the signs of | proportion, | as 2 : 4 :: 6 : 12. |

## VULGAR FRACTIONS.

A FRACTION is a part or parts of something considered as an unit or integer, and consists of two parts or quantities, one written over the other with a line between them, as ¼, ⅗, 15/28, &c.

The number placed below the line is called the denominator of the fraction, because it denominates or shows how many parts the unit is broken or divided into; and the number above the line is called the numerator, because it enumerates or shows how many of those parts are contained in the fraction.

A vulgar fraction is either proper, improper, compound, or mixed.

A proper fraction is such whose numerator is less than the denominator, as $\frac{2}{5}$, $\frac{7}{8}$, $\frac{23}{30}$, $\frac{161}{215}$, &c.

An improper fraction is when the numerator is equal to, or greater than its denominator, as $\frac{2}{2}$, $\frac{18}{12}$, $\frac{247}{42}$, &c.

A compound fraction is the fraction of a fraction, and known by the word of, as $\frac{3}{7}$ of $\frac{7}{8}$, of $\frac{4}{5}$, &c.

A mixed number is composed of a whole number and a fraction, as $4\frac{1}{4}$, $12\frac{7}{8}$, $142\frac{11}{19}$, &c.

## REDUCTION OF VULGAR FRACTIONS.

Case I.—To reduce a vulgar fraction to its lowest terms, divide the greater term by the less, and that divisor by the remainder following, till nothing remains: then by the last remainder divide both parts of the fraction, and the quotients will give the fraction required. If the remainder is 1, the fraction is already in its least terms.

### EXAMPLE.

Reduce $\frac{2832}{12848}$ to its lowest terms.

2832 ) 12848 ( 4 then 16 $\frac{2832}{12848}$ ( = $\frac{177}{803}$, *the Answer.*

1520 ) 2832 ( 1

1312 ) 1520 ( 1

208 ) 1312 ( 6

64 ) 208 ( 3

16 ) 64 ( 4

When the numerator and the denominator do each of them end with ciphers, strike off an equal number of ciphers in both, and the remaining figures will be a fraction of the same value, which reduce to its lowest terms.

Case II.—To reduce a compound fraction to a single one, multiply all the numerators together for a new numerator, and the denominators for a new denominator. Reduce the new fraction to its lowest terms by the last case. When it can be done, you may cancel the fractions, by dividing the numerator and denominator of any two terms by the same number, and use the quotient instead.

EXAMPLE.

Reduce $\frac{4}{9}$ of $\frac{5}{7}$ of $\frac{9}{10}$ to a single fraction.

Thus $\frac{4}{9} \times \frac{5}{7} \times \frac{9}{10} = \frac{180}{630}$, or $= \frac{2}{7}$, the fraction.

Or thus, $\frac{4}{9}$ of $\frac{5}{7}$ of $\frac{9}{10} = \frac{2}{7}$, as before.

CASE III.—To reduce whole or mixed numbers into an improper fraction. 1. If the whole number has no assigned denominator, an unit subscribed underneath must be the denominator. 2. If the whole number has an assigned denominator, multiply the whole number by the assigned denominator, and the product will be the numerator to the assigned denominator.

EXAMPLE.

Reduce 27 into a fraction, whose denominator shall be 12.

Thus, $27 \times 12 = 324$. Then $\frac{324}{12}$, the fraction required.

## ADDITION OF VULGAR FRACTIONS.

CASE I.—To add fractions together, having different denominators, reduce the given fractions to a common denominator. Add all the numerators together for a new numerator, under which subscribe the common denominator. And if it is an improper fraction, reduce it to its proper terms, and you have the sum of all the fractions.

EXAMPLE.

Add $\frac{3}{7}$, $\frac{1}{4}$, and $\frac{5}{6}$ together.

Thus, $\frac{3}{7} + \frac{1}{4} + \frac{5}{6} = \frac{72}{168} + \frac{42}{168} + \frac{140}{168} = \frac{254}{168}$ or $1\frac{43}{84}$, *Answer.*

CASE II.—To add mixed numbers, reduce the fractions to a common denominator, and add them together, as before directed, and annex their sum to the sum of the integers.

EXAMPLE.

Add $4\frac{1}{2}$ and $17\frac{3}{4}$ together.

First, $\frac{1}{2} + \frac{3}{4} = \frac{4}{8} + \frac{6}{8} = \frac{10}{8}$, or $\frac{2}{4} + \frac{3}{4} = \frac{5}{4}$, or $1\frac{1}{4}$.

Then, $4 + 17 + 1\frac{1}{4} = 22\frac{1}{4}$, the sum required.

## SUBTRACTION OF VULGAR FRACTIONS.

PREPARE the fractions as before directed in Addition. Subtract one numerator from the other, and their difference will be a new numerator, under which subscribe the common denominator.

EXAMPLE.

It is required to subtract $\frac{2}{9}$ from $\frac{11}{12}$.

Thus, $\frac{11}{12} - \frac{2}{9} = \frac{99}{108} - \frac{24}{108} = \frac{75}{108}$, or $\frac{25}{36}$, the difference required.

## MULTIPLICATION OF VULGAR FRACTIONS.

REDUCE compound fractions to simple ones, per Case II.; bring mixed numbers into improper fractions, per Case III.

Multiply the numerators together for a new numerator, and the denominators for a new denominator; or, if the fractions will cancel, do it as in Case II.

EXAMPLE.

Multiply $\frac{6}{11}$ by $\frac{7}{12}$.

Thus, $\frac{6}{11} \times \frac{7}{12} = \frac{7}{22}$, the product required.

## DIVISION OF VULGAR FRACTIONS.

PREPARE the fractions as before directed in Multiplication.

Multiply the numerator of the dividend into the denominator of the dividing fraction for a new numerator, and multiply the other numerator and denominator together for a new denominator; or invert the divisor, and then proceed as in the last rule.

EXAMPLE.

Divide $\frac{6}{7}$ by $\frac{3}{5}$.

Thus, $\frac{6}{7} \div \frac{3}{5}$ or $\frac{6}{7} \times \frac{5}{2} = \frac{10}{7}$ or $1\frac{3}{7}$, the quotient required.

## DECIMAL FRACTIONS.

A Decimal Fraction is a fraction whose denominator is always unity or 1, with one or more ciphers. Thus, an unit may be imagined to be equally divided into 10 parts, and each of these into ten more; so that, by a continual decimal subdivision, the unit may be supposed to be divided into 10, 100, 1000, and so on without end, all being equal parts, called tenth, hundredth, thousandth part of unit or 1.

In decimal fractions the figures of the numerator only are expressed, the denominator being omitted, because it is always known to consist of an unit with so many ciphers as there are places in the numerator.

A decimal fraction is distinguished from an integer by a point prefixed thus, ·5 which stands for $\frac{5}{10}$, or $\frac{1}{2}$; ·75, for $\frac{75}{100}$, or $\frac{3}{4}$; ·2752, $\frac{2752}{10000}$; and 12·010, for $12\frac{10}{1000}$ or $\frac{1}{100}$, &c.

Ciphers at the right hand of a decimal fraction alter not its value, for ·5, or ·50, or ·5000, are each of them the same value, and are equal to $\frac{5}{10}$ or $\frac{1}{2}$; but ciphers at the left hand, in a decimal fraction, decrease the value in a tenfold proportion, for ·05 is $\frac{5}{100}$; also ·0005 is $\frac{5}{10000}$, &c.

A finite decimal is that which ends at a certain number of places; but an infinite is that which no where ends. A circulating or recurring decimal is that wherein one or more figures are continually repeated. Thus, 64·766666, &c. or 64·7$\dot{6}$, is called a single circulating or recurring decimal, or repetend. And 147·642642, &c. or 147·$\dot{6}\dot{4}2$, is called a compound recurring decimal, or repetend.

In all operations, if the result consists of several nines, reject them, and make the next superior place an unit more. Thus, for 17·1999 write 17·2; and for 12·99 write 13, &c.

## ADDITION OF DECIMALS.

Addition of Decimals is performed after the same manner as addition of whole numbers; care being taken that like parts be placed under one another; and from their sum or difference cut off so many decimal parts as there are the most in any of the given numbers.

EXAMPLE.

What is the sum of ·0476, 21·476, ·0067, ·64, 17·6, and ·20764?

·0476
21·476
·0067
·64
17·6
·20764

*Answer* 39·97794

To add decimals wherein there are single repetends, repeat the circulating decimals till each line has an equal number of decimal places, and ends directly under each other, annexing a cipher or ciphers to the finite terms: then add as before; only increase the sum of the right hand row with as many units as it contains nines, and the figure in the sum under that place will be a repetend..

EXAMPLE.

What is the sum of 47·67$\dot{4}$, 4·02642, 32·$\dot{0}$, 6·1$\dot{4}$, and 27·064$\dot{0}$?

47·674444
4·026420
32·$\dot{0}$66666
6·14444
27·0640$\dot{6}$6

*Answer* 117·57664$\dot{4}$

## SUBTRACTION OF DECIMALS.

Subtraction of Decimals is performed after the same manner as subtraction of whole numbers; care being taken that like parts be placed under one another; and from their sum, or difference, cut off so many decimal parts as there are the most in any of the given numbers.

EXAMPLE.

What is the difference between 176 and 10·764?

From 176·
take 10·764

*Diff.* 165·236

## MULTIPLICATION OF DECIMALS.

MULTIPLICATION OF DECIMALS is also performed as in whole numbers, no regard being had to the decimals, as such, till the product is obtained; then observe the following rules:—1. Strike off so many figures from the right hand of the product as there are decimal places in the multiplier and multiplicand. 2. If there are not so many figures in the product, supply the deficiency by prefixing ciphers to the left hand, to make them equal. 3. If the number is to be multiplied by 10, 1000, &c. remove the separating point in the multiplicand so many places towards the the right hand as there are ciphers in the multiplier.

EXAMPLE.

Multiply ·17504 by 76.

·17504
76
*Prod.* 13·30304

## DIVISION OF DECIMALS.

IN DIVISION OF DECIMALS the work is likewise performed as in whole numbers; the only difficulty is in valuing the quotient, which will be made easy by observing either of the following general rules:—The first figure in the quotient is always of the same value with that figure of the dividend which answers or stands over the place of units in the divisor. The quotient must always have so many decimal places as the dividend has more than the divisor.

EXAMPLE.

Divide 1735·5 by 6·5.

6·5 ) 1735·5 ( 267 *Answer.*

## REDUCTION OF DECIMALS.

To reduce a vulgar fraction to a decimal. Add ciphers to the numerator, and divide by the denominator; the quotient will be the decimal fraction required.

EXAMPLE.

Reduce $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$ to decimals.

Thus, 1·00÷4=·25; and 1·0÷2=·5; also 3·00÷4=·75. *Ans.*

## INTEREST

Interest is a profit allowed by the borrower of money to the lender, for the loan or use of it for some determined space of time. The sum lent is called the principal; the interest and principal added together are called the amount.

The rate of interest is usually 5 per cent. per ann. (per centum per annum), or £5 for every 100 for a year. 5 per cent. is the utmost that can be allowed by law, except under certain circumstances, but the rate of interest may vary to any smaller sum according to agreement. Interest is of two kinds, Simple and Compound. Simple Interest is computed only on the sum lent, although it should remain unpaid for several years; Compound Interest, by accumulating the interest with the principal at the term when it is payable, and charging interest on the amount during the following period.

The rules for Simple Interest serve also for calculating Factorage, Brokerage, Insurance, purchasing of Stocks, or any thing else that is rated at so much per cent.

Case I.—When the rate of interest is an even number of pounds.

*Rule.*—To find the interest of any sum of money for any number of years, multiply the principal by the rate per cent.; that product divided by 100, will give the interest for a year, which multiply by the number of years given, and the product will be the answer.

EXAMPLE.

What is the interest of £672 for 7 years, at 4 per cent. per annum?

| | £ | | |
|---|---|---|---|
| | 672 | | |
| | 4 | | |
| 1,00 ) | 26,88 | | |
| | 26 | 17 | 7 |
| | | | 7 |
| Interest | 188 | 3 | 1 |
| Principal | 672 | 0 | 0 |
| Amount | £860 | 3 | 1 |

CASE II.—When the rate per cent. is $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$ more than the pounds given in the said rate, multiply the principal by the pounds in the rate per cent., then take parts for $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$, from the principal, which add to the product, and the sum divide by 100, as before.

EXAMPLE.

What is the interest of £600 for 7 years, at $3\frac{3}{4}$ per cent. per annum?

| | £ |
|---|---|
| $\frac{1}{2}$ per cent.—2 ) | 600 |
| | 3 |
| | 1800 |
| $\frac{1}{4}$ per cent.—2 ) | 300 |
| | 150 |
| 1,00 ) | 22,50 |
| | 22 10 |
| | 7 |
| *Answer*, | £157 10 |

COMPOUND INTEREST, as before stated, is that which arises both from the principal and its interest put together. As the interest becomes due, but not paid, in some cases the same interest is allowed upon that interest unpaid, as was upon the principal; so that it becomes a part of the principal, and is called interest upon interest, or compound interest.

It is not lawful to let out money at compound interest; yet, in purchasing of annuities or pensions, and leases in reversion, it is usual to allow compound interest to the purchaser, for his ready money.

*Rule.*—Find the first year's interest as in simple interest. Add that interest to the principal, which sum will become the second year's principal, and so on for any number of years.

Subtract the given principal from the last amount, and the remainder will be the interest required.

EXAMPLE.

What is the compound interest of £600 for 3 years, at 5 per cent.?

| | | | |
|---|---|---|---|
| | £ | | |
| | 600 | | |
| | 5 | | |
| 1,00) | 30,00 | | |
| | 30 | | |
| | 600 | | |
| Second year's principal, | 630 | | |
| | 5 | | |
| 1,00) | 31,50 | | |
| | 31 | 10 | |
| | 630 | | |
| Third year's principal, | 661 | 10 | |
| | 5 | | |
| 1,00) | 33,07 | 10 | |
| | 33 | 1 | 6 |
| | 661 | 10 | |
| Amount, | 694 | 11 | 6 |
| Original principal, | 600 | 0 | 0 |
| *Answer*, | £94 | 11 | 6 |

As the calculation of interest on variable amounts, and for an indefinite number of days, is attended by considerable loss of time, the use of the following tables will be found advantageous. It will be easily seen, that by the help of addition and multiplication, the interest of any sum may be found, for any number of days, without the labour of tedious calculations. In the first column is the principal, and in the upper row the number of days; thus the interest of any sum may be found in a line with the one, and underneath the other.

# INTEREST TABLE.

| Prin. | 1 day. | | | 2 days. | | | 3 days. | | | 4 days. | | | 5 days. | | | 6 days. | | | 7 days. | | | 8 days. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| £ | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $0\frac{1}{4}$ |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{2}$ |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{3}{4}$ |
| 4 | 0 | 0 | 0 | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | 1 |
| 5 | 0 | 0 | 0 | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | 1 | 0 | 0 | $1\frac{1}{4}$ |
| 6 | 0 | 0 | 0 | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $1\frac{1}{2}$ |
| 7 | 0 | 0 | 0 | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | 1 | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $1\frac{1}{2}$ | 0 | 0 | $1\frac{3}{4}$ |
| 8 | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | 1 | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $1\frac{1}{2}$ | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | 2 |
| 9 | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | 1 | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | 2 | 0 | 0 | $2\frac{1}{4}$ |
| 10 | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $1\frac{1}{2}$ | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | $2\frac{1}{4}$ | 0 | 0 | $2\frac{1}{2}$ |
| 20 | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | $2\frac{1}{2}$ | 0 | 0 | $3\frac{1}{4}$ | 0 | 0 | $3\frac{3}{4}$ | 0 | 0 | $4\frac{1}{2}$ | 0 | 0 | $5\frac{1}{4}$ |
| 30 | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | $2\frac{3}{4}$ | 0 | 0 | $3\frac{3}{4}$ | 0 | 0 | $4\frac{3}{4}$ | 0 | 0 | $5\frac{3}{4}$ | 0 | 0 | $6\frac{3}{4}$ | 0 | 0 | $7\frac{3}{4}$ |
| 40 | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $2\frac{1}{2}$ | 0 | 0 | $3\frac{3}{4}$ | 0 | 0 | $5\frac{1}{4}$ | 0 | 0 | $6\frac{1}{2}$ | 0 | 0 | $7\frac{3}{4}$ | 0 | 0 | 9 | 0 | 0 | $10\frac{1}{2}$ |
| 50 | 0 | 0 | $1\frac{1}{2}$ | 0 | 0 | $3\frac{1}{4}$ | 0 | 0 | $4\frac{3}{4}$ | 0 | 0 | $6\frac{1}{2}$ | 0 | 0 | 8 | 0 | 0 | $9\frac{3}{4}$ | 0 | 0 | $11\frac{1}{2}$ | 0 | 1 | 1 |
| 60 | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | $3\frac{3}{4}$ | 0 | 0 | $5\frac{3}{4}$ | 0 | 0 | $7\frac{3}{4}$ | 0 | 0 | $9\frac{3}{4}$ | 0 | 0 | $11\frac{3}{4}$ | 0 | 1 | $1\frac{3}{4}$ | 0 | 1 | $3\frac{3}{4}$ |
| 70 | 0 | 0 | $2\frac{1}{4}$ | 0 | 0 | $4\frac{1}{2}$ | 0 | 0 | $6\frac{3}{4}$ | 0 | 0 | 9 | 0 | 0 | $11\frac{1}{2}$ | 0 | 1 | $1\frac{3}{4}$ | 0 | 1 | 4 | 0 | 1 | $6\frac{1}{4}$ |
| 80 | 0 | 0 | $2\frac{1}{2}$ | 0 | 0 | $5\frac{1}{4}$ | 0 | 0 | $7\frac{3}{4}$ | 0 | 0 | $10\frac{1}{2}$ | 0 | 1 | 1 | 0 | 1 | $3\frac{3}{4}$ | 0 | 1 | $6\frac{1}{4}$ | 0 | 1 | 9 |
| 90 | 0 | 0 | $2\frac{3}{4}$ | 0 | 0 | $5\frac{3}{4}$ | 0 | 0 | $8\frac{3}{4}$ | 0 | 0 | $11\frac{3}{4}$ | 0 | 1 | $2\frac{3}{4}$ | 0 | 1 | $5\frac{3}{4}$ | 0 | 1 | $8\frac{1}{2}$ | 0 | 1 | $11\frac{1}{2}$ |
| 100 | 0 | 0 | $3\frac{1}{4}$ | 0 | 0 | $6\frac{1}{2}$ | 0 | 0 | $9\frac{5}{4}$ | 0 | 1 | 1 | 0 | 1 | $4\frac{1}{4}$ | 0 | 1 | $7\frac{1}{2}$ | 0 | 1 | 11 | 0 | 2 | $2\frac{1}{4}$ |
| 200 | 0 | 0 | $6\frac{1}{2}$ | 0 | 1 | 1 | 0 | 1 | $7\frac{1}{2}$ | 0 | 2 | $2\frac{1}{4}$ | 0 | 2 | $8\frac{5}{4}$ | 0 | 3 | $3\frac{1}{4}$ | 0 | 3 | 10 | 0 | 4 | $4\frac{1}{2}$ |
| 300 | 0 | 0 | $9\frac{3}{4}$ | 0 | 1 | $7\frac{1}{2}$ | 0 | 2 | $5\frac{1}{2}$ | 0 | 3 | $3\frac{1}{4}$ | 0 | 4 | $1\frac{1}{4}$ | 0 | 4 | 11 | 0 | 5 | 9 | 0 | 6 | $6\frac{3}{4}$ |
| 400 | 0 | 1 | 1 | 0 | 2 | $2\frac{1}{4}$ | 0 | 3 | $3\frac{1}{4}$ | 0 | 4 | $4\frac{1}{2}$ | 0 | 5 | $5\frac{3}{4}$ | 0 | 6 | $6\frac{3}{4}$ | 0 | 7 | 8 | 0 | 8 | 9 |
| 500 | 0 | 1 | $4\frac{1}{4}$ | 0 | 2 | $8\frac{3}{4}$ | 0 | 4 | $1\frac{1}{4}$ | 0 | 5 | $5\frac{3}{4}$ | 0 | 6 | 10 | 0 | 8 | $2\frac{1}{2}$ | 0 | 9 | 7 | 0 | 10 | $11\frac{1}{2}$ |
| 800 | 0 | 2 | $2\frac{1}{4}$ | 0 | 4 | $4\frac{1}{2}$ | 0 | 6 | $6\frac{3}{4}$ | 0 | 8 | 9 | 0 | 10 | $11\frac{1}{2}$ | 0 | 13 | $1\frac{3}{4}$ | 0 | 15 | 4 | 0 | 17 | $6\frac{1}{4}$ |
| 1000 | 0 | 2 | $8\frac{3}{4}$ | 0 | 5 | $5\frac{3}{4}$ | 0 | 8 | $2\frac{1}{2}$ | 0 | 10 | $11\frac{1}{2}$ | 0 | 13 | $8\frac{1}{4}$ | 0 | 16 | $5\frac{1}{4}$ | 0 | 19 | 2 | 1 | 1 | 11 |

## INTEREST TABLE,—(*Continued.*)

| Prin. | 9 days. | | | 10 days. | | | 11 days. | | | 12 days. | | | 13 days. | | | 14 days. | | | 15 days. | | | 16 days. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| £ | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* |
| 1 | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{4}$ | 0 | 0 | $0\frac{1}{2}$ |
| 2 | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | 1 |
| 3 | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $1\frac{1}{2}$ |
| 4 | 0 | 0 | 1 | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $1\frac{1}{2}$ | 0 | 0 | $1\frac{1}{2}$ | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | 2 |
| 5 | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $1\frac{1}{2}$ | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | $1\frac{5}{4}$ | 0 | 0 | 2 | 0 | 0 | $2\frac{1}{4}$ | 0 | 0 | $2\frac{1}{4}$ | 0 | 0 | $2\frac{1}{2}$ |
| 6 | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | $1\frac{5}{4}$ | 0 | 0 | 2 | 0 | 0 | $2\frac{1}{4}$ | 0 | 0 | $2\frac{1}{2}$ | 0 | 0 | $2\frac{3}{4}$ | 0 | 0 | $2\frac{3}{4}$ | 0 | 0 | 3 |
| 7 | 0 | 0 | 2 | 0 | 0 | $2\frac{1}{4}$ | 0 | 0 | $2\frac{1}{2}$ | 0 | 0 | $2\frac{3}{4}$ | 0 | 0 | $2\frac{5}{4}$ | 0 | 0 | 3 | 0 | 0 | $3\frac{1}{4}$ | 0 | 0 | $3\frac{1}{2}$ |
| 8 | 0 | 0 | $2\frac{1}{4}$ | 0 | 0 | $2\frac{1}{2}$ | 0 | 0 | $2\frac{3}{4}$ | 0 | 0 | 3 | 0 | 0 | $3\frac{1}{4}$ | 0 | 0 | $3\frac{1}{2}$ | 0 | 0 | $3\frac{3}{4}$ | 0 | 0 | 4 |
| 9 | 0 | 0 | $2\frac{1}{2}$ | 0 | 0 | $2\frac{5}{4}$ | 0 | 0 | $3\frac{1}{4}$ | 0 | 0 | $3\frac{1}{2}$ | 0 | 0 | $3\frac{5}{4}$ | 0 | 0 | 4 | 0 | 0 | $4\frac{1}{4}$ | 0 | 0 | $4\frac{1}{2}$ |
| 10 | 0 | 0 | $2\frac{3}{4}$ | 0 | 0 | $3\frac{1}{4}$ | 0 | 0 | $3\frac{1}{2}$ | 0 | 0 | $3\frac{3}{4}$ | 0 | 0 | $4\frac{1}{4}$ | 0 | 0 | $4\frac{1}{2}$ | 0 | 0 | $4\frac{3}{4}$ | 0 | 0 | $5\frac{1}{4}$ |
| 20 | 0 | 0 | $5\frac{3}{4}$ | 0 | 0 | $6\frac{1}{2}$ | 0 | 0 | 7 | 0 | 0 | $7\frac{3}{4}$ | 0 | 0 | $8\frac{1}{2}$ | 0 | 0 | 9 | 0 | 0 | $9\frac{3}{4}$ | 0 | 0 | $10\frac{1}{2}$ |
| 30 | 0 | 0 | $8\frac{3}{4}$ | 0 | 0 | $9\frac{3}{4}$ | 0 | 0 | $10\frac{3}{4}$ | 0 | 0 | $11\frac{3}{4}$ | 0 | 1 | $0\frac{3}{4}$ | 0 | 1 | $1\frac{3}{4}$ | 0 | 1 | $2\frac{3}{4}$ | 0 | 1 | $3\frac{3}{4}$ |
| 40 | 0 | 0 | $11\frac{5}{4}$ | 0 | 1 | 1 | 0 | 1 | $2\frac{1}{4}$ | 0 | 1 | $3\frac{3}{4}$ | 0 | 1 | 5 | 0 | 1 | $6\frac{1}{4}$ | 0 | 1 | $7\frac{1}{2}$ | 0 | 1 | 9 |
| 50 | 0 | 1 | $2\frac{3}{4}$ | 0 | 1 | $4\frac{1}{4}$ | 0 | 1 | 6 | 0 | 1 | $7\frac{1}{2}$ | 0 | 1 | $9\frac{1}{4}$ | 0 | 1 | 11 | 0 | 2 | $0\frac{1}{2}$ | 0 | 2 | $2\frac{1}{4}$ |
| 60 | 0 | 1 | $5\frac{3}{4}$ | 0 | 1 | $7\frac{1}{2}$ | 0 | 1 | $9\frac{1}{2}$ | 0 | 1 | $11\frac{1}{2}$ | 0 | 2 | $1\frac{1}{2}$ | 0 | 2 | $3\frac{1}{2}$ | 0 | 2 | $5\frac{1}{2}$ | 0 | 2 | $7\frac{1}{2}$ |
| 70 | 0 | 1 | $8\frac{1}{2}$ | 0 | 1 | 11 | 0 | 2 | $1\frac{1}{4}$ | 0 | 2 | $3\frac{1}{2}$ | 0 | 2 | $5\frac{3}{4}$ | 0 | 2 | 8 | 0 | 2 | $10\frac{1}{2}$ | 0 | 3 | $0\frac{3}{4}$ |
| 80 | 0 | 1 | $11\frac{1}{2}$ | 0 | 2 | $2\frac{1}{4}$ | 0 | 2 | $4\frac{3}{4}$ | 0 | 2 | $7\frac{1}{2}$ | 0 | 2 | 10 | 0 | 3 | $0\frac{3}{4}$ | 0 | 3 | $3\frac{1}{4}$ | 0 | 3 | 6 |
| 90 | 0 | 2 | $2\frac{1}{2}$ | 0 | 2 | $5\frac{1}{2}$ | 0 | 2 | $8\frac{1}{2}$ | 0 | 2 | $11\frac{1}{2}$ | 0 | 3 | $2\frac{1}{4}$ | 0 | 3 | $5\frac{1}{4}$ | 0 | 3 | $8\frac{1}{4}$ | 0 | 3 | $11\frac{1}{4}$ |
| 100 | 0 | 2 | $5\frac{1}{2}$ | 0 | 2 | $8\frac{3}{4}$ | 0 | 3 | 0 | 0 | 3 | $3\frac{1}{4}$ | 0 | 3 | $6\frac{1}{2}$ | 0 | 3 | 10 | 0 | 4 | $1\frac{1}{4}$ | 0 | 4 | $4\frac{1}{2}$ |
| 200 | 0 | 4 | 11 | 0 | 5 | $5\frac{3}{4}$ | 0 | 6 | $0\frac{1}{4}$ | 0 | 6 | $6\frac{3}{4}$ | 0 | 7 | $1\frac{1}{4}$ | 0 | 7 | 8 | 0 | 8 | $2\frac{1}{2}$ | 0 | 8 | 9 |
| 300 | 0 | 7 | $4\frac{3}{4}$ | 0 | 8 | $2\frac{1}{2}$ | 0 | 9 | $0\frac{1}{4}$ | 0 | 9 | $10\frac{1}{4}$ | 0 | 10 | 8 | 0 | 11 | 6 | 0 | 12 | $3\frac{3}{4}$ | 0 | 13 | $1\frac{5}{4}$ |
| 400 | 0 | 9 | $10\frac{1}{4}$ | 0 | 10 | $11\frac{1}{2}$ | 0 | 12 | $0\frac{1}{2}$ | 0 | 13 | $1\frac{3}{4}$ | 0 | 14 | $2\frac{5}{4}$ | 0 | 15 | 4 | 0 | 16 | $5\frac{1}{4}$ | 0 | 17 | $6\frac{1}{4}$ |
| 500 | 0 | 12 | $3\frac{3}{4}$ | 0 | 13 | $8\frac{1}{4}$ | 0 | 15 | $0\frac{3}{4}$ | 0 | 16 | $5\frac{1}{4}$ | 0 | 17 | $9\frac{1}{2}$ | 0 | 19 | 2 | 1 | 0 | $6\frac{1}{4}$ | 1 | 1 | 11 |
| 800 | 0 | 19 | $8\frac{1}{2}$ | 1 | 1 | 11 | 1 | 4 | $1\frac{1}{4}$ | 1 | 6 | $3\frac{1}{2}$ | 1 | 8 | $5\frac{3}{4}$ | 1 | 10 | 8 | 1 | 12 | $10\frac{1}{2}$ | 1 | 15 | $0\frac{3}{4}$ |
| 1000 | 1 | 4 | $7\frac{5}{4}$ | 1 | 7 | $4\frac{3}{4}$ | 1 | 10 | $1\frac{1}{2}$ | 1 | 12 | $10\frac{1}{2}$ | 1 | 15 | $7\frac{1}{4}$ | 1 | 18 | $4\frac{1}{4}$ | 2 | 1 | 1 | 2 | 3 | 10 |

## INTEREST TABLE.—(*Continued.*)

| Prin. | 17 days. | | | 18 days. | | | 19 days. | | | 20 days. | | | 21 days. | | | 22 days. | | | 23 days. | | | 24 days. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| £ | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* |
| 1 | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{1}{2}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | $0\frac{3}{4}$ |
| 2 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $1\frac{1}{4}$ | 0 | 0 | $1\frac{1}{2}$ | 0 | 0 | $1\frac{1}{2}$ |
| 3 | 0 | 0 | $1\frac{1}{2}$ | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | $2\frac{1}{4}$ | 0 | 0 | $2\frac{1}{4}$ |
| 4 | 0 | 0 | 2 | 0 | 0 | $2\frac{1}{4}$ | 0 | 0 | $2\frac{1}{4}$ | 0 | 0 | $2\frac{1}{2}$ | 0 | 0 | $2\frac{3}{4}$ | 0 | 0 | $2\frac{3}{4}$ | 0 | 0 | 3 | 0 | 0 | 3 |
| 5 | 0 | 0 | $2\frac{3}{4}$ | 0 | 0 | $2\frac{3}{4}$ | 0 | 0 | 3 | 0 | 0 | $3\frac{1}{4}$ | 0 | 0 | $3\frac{1}{4}$ | 0 | 0 | $3\frac{1}{2}$ | 0 | 0 | $3\frac{3}{4}$ | 0 | 0 | $3\frac{3}{4}$ |
| 6 | 0 | 0 | $3\frac{1}{4}$ | 0 | 0 | $3\frac{1}{2}$ | 0 | 0 | $3\frac{1}{2}$ | 0 | 0 | $3\frac{3}{4}$ | 0 | 0 | 4 | 0 | 0 | $4\frac{1}{4}$ | 0 | 0 | $4\frac{1}{2}$ | 0 | 0 | $4\frac{1}{2}$ |
| 7 | 0 | 0 | $3\frac{3}{4}$ | 0 | 0 | 4 | 0 | 0 | $4\frac{1}{4}$ | 0 | 0 | $4\frac{1}{2}$ | 0 | 0 | $4\frac{3}{4}$ | 0 | 0 | 5 | 0 | 0 | $5\frac{1}{4}$ | 0 | 0 | $5\frac{1}{2}$ |
| 8 | 0 | 0 | $4\frac{1}{4}$ | 0 | 0 | $4\frac{1}{2}$ | 0 | 0 | $4\frac{3}{4}$ | 0 | 0 | $5\frac{1}{4}$ | 0 | 0 | $5\frac{1}{2}$ | 0 | 0 | $5\frac{3}{4}$ | 0 | 0 | 6 | 0 | 0 | $6\frac{1}{4}$ |
| 9 | 0 | 0 | 5 | 0 | 0 | $5\frac{1}{4}$ | 0 | 0 | $5\frac{1}{2}$ | 0 | 0 | $5\frac{3}{4}$ | 0 | 0 | 6 | 0 | 0 | $6\frac{1}{2}$ | 0 | 0 | $6\frac{3}{4}$ | 0 | 0 | 7 |
| 10 | 0 | 0 | $5\frac{1}{2}$ | 0 | 0 | $5\frac{3}{4}$ | 0 | 0 | 6 | 0 | 0 | $6\frac{1}{2}$ | 0 | 0 | $6\frac{3}{4}$ | 0 | 0 | 7 | 0 | 0 | $7\frac{1}{2}$ | 0 | 0 | $7\frac{3}{4}$ |
| 20 | 0 | 0 | 11 | 0 | 0 | $11\frac{3}{4}$ | 0 | 1 | $0\frac{1}{4}$ | 0 | 1 | 1 | 0 | 1 | $1\frac{3}{4}$ | 0 | 1 | $2\frac{1}{4}$ | 0 | 1 | 3 | 0 | 1 | $3\frac{3}{4}$ |
| 30 | 0 | 1 | $4\frac{3}{4}$ | 0 | 1 | $5\frac{3}{4}$ | 0 | 1 | $6\frac{1}{2}$ | 0 | 1 | $7\frac{1}{2}$ | 0 | 1 | $8\frac{1}{2}$ | 0 | 1 | $9\frac{1}{2}$ | 0 | 1 | $10\frac{1}{2}$ | 0 | 1 | $11\frac{1}{2}$ |
| 40 | 0 | 1 | $10\frac{1}{4}$ | 0 | 1 | $11\frac{1}{2}$ | 0 | 2 | $0\frac{3}{4}$ | 0 | 2 | $2\frac{1}{4}$ | 0 | 2 | $3\frac{1}{2}$ | 0 | 2 | $4\frac{3}{4}$ | 0 | 2 | 6 | 0 | 2 | $7\frac{1}{2}$ |
| 50 | 0 | 2 | $3\frac{3}{4}$ | 0 | 2 | $5\frac{1}{2}$ | 0 | 2 | 7 | 0 | 2 | $8\frac{3}{4}$ | 0 | 2 | $10\frac{1}{2}$ | 0 | 3 | 0 | 0 | 3 | $1\frac{3}{4}$ | 0 | 3 | $3\frac{1}{4}$ |
| 60 | 0 | 2 | $9\frac{1}{2}$ | 0 | 2 | $11\frac{1}{2}$ | 0 | 3 | $1\frac{1}{4}$ | 0 | 3 | $3\frac{1}{4}$ | 0 | 3 | $5\frac{1}{4}$ | 0 | 3 | $7\frac{1}{4}$ | 0 | 3 | $9\frac{1}{4}$ | 0 | 3 | $11\frac{1}{4}$ |
| 70 | 0 | 3 | 3 | 0 | 3 | $5\frac{1}{4}$ | 0 | 3 | $7\frac{1}{2}$ | 0 | 3 | 10 | 0 | 4 | $0\frac{1}{4}$ | 0 | 4 | $2\frac{1}{4}$ | 0 | 4 | $4\frac{3}{4}$ | 0 | 4 | 7 |
| 80 | 0 | 3 | $8\frac{1}{2}$ | 0 | 3 | $11\frac{1}{4}$ | 0 | 4 | $1\frac{3}{4}$ | 0 | 4 | $4\frac{1}{2}$ | 0 | 4 | 7 | 0 | 4 | $9\frac{3}{4}$ | 0 | 5 | $0\frac{1}{4}$ | 0 | 5 | 3 |
| 90 | 0 | 4 | $2\frac{1}{4}$ | 0 | 4 | $5\frac{1}{4}$ | 0 | 4 | 8 | 0 | 4 | 11 | 0 | 5 | 2 | 0 | 5 | 5 | 0 | 5 | 8 | 0 | 5 | 11 |
| 100 | 0 | 4 | $7\frac{3}{4}$ | 0 | 4 | 11 | 0 | 5 | $2\frac{1}{4}$ | 0 | 5 | $5\frac{3}{4}$ | 0 | 5 | 9 | 0 | 6 | $0\frac{1}{4}$ | 0 | 6 | $3\frac{1}{2}$ | 0 | 6 | $6\frac{3}{4}$ |
| 200 | 0 | 9 | $3\frac{3}{4}$ | 0 | 9 | $10\frac{1}{4}$ | 0 | 10 | $4\frac{3}{4}$ | 0 | 10 | $11\frac{1}{2}$ | 0 | 11 | 6 | 0 | 12 | $0\frac{1}{2}$ | 0 | 12 | 7 | 0 | 13 | $1\frac{3}{4}$ |
| 300 | 0 | 13 | $11\frac{1}{2}$ | 0 | 14 | $9\frac{1}{2}$ | 0 | 15 | $7\frac{1}{4}$ | 0 | 16 | $5\frac{1}{4}$ | 0 | 17 | 3 | 0 | 18 | $0\frac{3}{4}$ | 0 | 18 | $10\frac{3}{4}$ | 0 | 19 | $8\frac{1}{2}$ |
| 400 | 0 | 18 | $7\frac{1}{2}$ | 0 | 19 | $8\frac{1}{2}$ | 1 | 0 | $9\frac{3}{4}$ | 1 | 1 | 11 | 1 | 3 | 0 | 1 | 4 | $1\frac{1}{4}$ | 1 | 5 | $2\frac{1}{4}$ | 1 | 6 | $3\frac{1}{2}$ |
| 500 | 1 | 3 | $3\frac{1}{4}$ | 1 | 4 | $7\frac{3}{4}$ | 1 | 6 | $0\frac{1}{4}$ | 1 | 7 | $4\frac{3}{4}$ | 1 | 8 | 9 | 1 | 10 | $1\frac{1}{2}$ | 1 | 11 | 6 | 1 | 12 | $10\frac{1}{2}$ |
| 800 | 1 | 17 | 3 | 1 | 19 | $5\frac{1}{4}$ | 2 | 1 | $7\frac{1}{2}$ | 2 | 3 | 10 | 2 | 6 | $0\frac{1}{4}$ | 2 | 8 | $2\frac{1}{2}$ | 2 | 10 | $4\frac{3}{4}$ | 2 | 12 | 7 |
| 1000 | 2 | 6 | $6\frac{5}{4}$ | 2 | 9 | $3\frac{3}{4}$ | 2 | 12 | $0\frac{1}{2}$ | 2 | 14 | $9\frac{1}{2}$ | 2 | 17 | $6\frac{1}{4}$ | 3 | 0 | $3\frac{1}{4}$ | 3 | 3 | 0 | 3 | 5 | 9 |

## INTEREST TABLE,—(*Continued.*)

| Prin. | 25 days. | | | 26 days. | | | 27 days. | | | 28 days | | | 29 days. | | | 30 days. | | | 31 days. | | | 32 days. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| £ | £ | *s.* | *d.* | £ | *s.* | *d* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* |
| 1 | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | $0\frac{3}{4}$ | 0 | 0 | 1 | 0 | 0 | 1 |
| 2 | 0 | 0 | $1\frac{1}{2}$ | 0 | 0 | $1\frac{1}{2}$ | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | $1\frac{3}{4}$ | 0 | 0 | 2 | 0 | 0 | 2 |
| 3 | 0 | 0 | $2\frac{1}{4}$ | 0 | 0 | $2\frac{1}{2}$ | 0 | 0 | $2\frac{1}{2}$ | 0 | 0 | $2\frac{3}{4}$ | 0 | 0 | $2\frac{3}{4}$ | 0 | 0 | $2\frac{3}{4}$ | 0 | 0 | 3 | 0 | 0 | 3 |
| 4 | 0 | 0 | $3\frac{1}{4}$ | 0 | 0 | $3\frac{1}{4}$ | 0 | 0 | $3\frac{1}{2}$ | 0 | 0 | $3\frac{1}{2}$ | 0 | 0 | $3\frac{3}{4}$ | 0 | 0 | $3\frac{3}{4}$ | 0 | 0 | 4 | 0 | 0 | 4 |
| 5 | 0 | 0 | 4 | 0 | 0 | $4\frac{1}{4}$ | 0 | 0 | $4\frac{1}{4}$ | 0 | 0 | $4\frac{1}{2}$ | 0 | 0 | $4\frac{3}{4}$ | 0 | 0 | $4\frac{3}{4}$ | 0 | 0 | 5 | 0 | 0 | $5\frac{1}{4}$ |
| 6 | 0 | 0 | $4\frac{3}{4}$ | 0 | 0 | 5 | 0 | 0 | $5\frac{1}{4}$ | 0 | 0 | $5\frac{1}{2}$ | 0 | 0 | $5\frac{1}{2}$ | 0 | 0 | $5\frac{3}{4}$ | 0 | 0 | 6 | 0 | 0 | $6\frac{1}{4}$ |
| 7 | 0 | 0 | $5\frac{3}{4}$ | 0 | 0 | $5\frac{3}{4}$ | 0 | 0 | 6 | 0 | 0 | $6\frac{1}{4}$ | 0 | 0 | $6\frac{1}{2}$ | 0 | 0 | $6\frac{3}{4}$ | 0 | 0 | 7 | 0 | 0 | $7\frac{1}{4}$ |
| 8 | 0 | 0 | $6\frac{1}{2}$ | 0 | 0 | $6\frac{3}{4}$ | 0 | 0 | 7 | 0 | 0 | $7\frac{1}{4}$ | 0 | 0 | $7\frac{1}{2}$ | 0 | 0 | $7\frac{3}{4}$ | 0 | 0 | 8 | 0 | 0 | $8\frac{1}{4}$ |
| 9 | 0 | 0 | $7\frac{1}{4}$ | 0 | 0 | $7\frac{1}{2}$ | 0 | 0 | $7\frac{3}{4}$ | 0 | 0 | $8\frac{1}{4}$ | 0 | 0 | $8\frac{1}{2}$ | 0 | 0 | $8\frac{3}{4}$ | 0 | 0 | 9 | 0 | 0 | $9\frac{1}{4}$ |
| 10 | 0 | 0 | 8 | 0 | 0 | $8\frac{1}{2}$ | 0 | 0 | $8\frac{3}{4}$ | 0 | 0 | 9 | 0 | 0 | $9\frac{1}{2}$ | 0 | 0 | $9\frac{3}{4}$ | 0 | 0 | 10 | 0 | 0 | $10\frac{1}{2}$ |
| 20 | 0 | 1 | $4\frac{1}{4}$ | 0 | 1 | 5 | 0 | 1 | $5\frac{3}{4}$ | 0 | 1 | $6\frac{1}{4}$ | 0 | 1 | 7 | 0 | 1 | $7\frac{1}{2}$ | 0 | 1 | $8\frac{1}{4}$ | 0 | 1 | 9 |
| 30 | 0 | 2 | $0\frac{1}{2}$ | 0 | 2 | $1\frac{1}{2}$ | 0 | 2 | $2\frac{1}{2}$ | 0 | 2 | $3\frac{1}{2}$ | 0 | 2 | $4\frac{1}{2}$ | 0 | 2 | $5\frac{1}{2}$ | 0 | 2 | $6\frac{1}{2}$ | 0 | 2 | $7\frac{1}{2}$ |
| 40 | 0 | 2 | $8\frac{3}{4}$ | 0 | 2 | 10 | 0 | 2 | $11\frac{1}{2}$ | 0 | 3 | $0\frac{3}{4}$ | 0 | 3 | 2 | 0 | 3 | $3\frac{1}{4}$ | 0 | 3 | $4\frac{3}{4}$ | 0 | 3 | 6 |
| 50 | 0 | 3 | 5 | 0 | 3 | $6\frac{1}{2}$ | 0 | 3 | $8\frac{1}{4}$ | 0 | 3 | 10 | 0 | 3 | $11\frac{1}{2}$ | 0 | 4 | $1\frac{1}{4}$ | 0 | 4 | $2\frac{3}{4}$ | 0 | 4 | $4\frac{1}{2}$ |
| 60 | 0 | 4 | $1\frac{1}{4}$ | 0 | 4 | $3\frac{1}{4}$ | 0 | 4 | $5\frac{1}{4}$ | 0 | 4 | 7 | 0 | 4 | 9 | 0 | 4 | 11 | 0 | 5 | 1 | 0 | 5 | 3 |
| 70 | 0 | 4 | $9\frac{1}{2}$ | 0 | 4 | $11\frac{3}{4}$ | 0 | 5 | 2 | 0 | 5 | $4\frac{1}{4}$ | 0 | 5 | $6\frac{1}{2}$ | 0 | 5 | 9 | 0 | 5 | $11\frac{1}{4}$ | 0 | 6 | $1\frac{1}{2}$ |
| 80 | 0 | 5 | $5\frac{3}{4}$ | 0 | 5 | $8\frac{1}{4}$ | 0 | 5 | 11 | 0 | 6 | $1\frac{1}{2}$ | 0 | 6 | $4\frac{1}{4}$ | 0 | 6 | $6\frac{3}{4}$ | 0 | 6 | $9\frac{1}{2}$ | 0 | 7 | 0 |
| 90 | 0 | 6 | $1\frac{3}{4}$ | 0 | 6 | $4\frac{3}{4}$ | 0 | 6 | $7\frac{3}{4}$ | 0 | 6 | $10\frac{3}{4}$ | 0 | 7 | $1\frac{3}{4}$ | 0 | 7 | $4\frac{3}{4}$ | 0 | 7 | $7\frac{1}{2}$ | 0 | 7 | $10\frac{1}{2}$ |
| 100 | 0 | 6 | 10 | 0 | 7 | $1\frac{1}{4}$ | 0 | 7 | $4\frac{3}{4}$ | 0 | 7 | 8 | 0 | 7 | $11\frac{1}{4}$ | 0 | 8 | $2\frac{1}{2}$ | 0 | 8 | $5\frac{1}{4}$ | 0 | 8 | 9 |
| 200 | 0 | 13 | $8\frac{1}{4}$ | 0 | 14 | $2\frac{3}{4}$ | 0 | 14 | $9\frac{1}{2}$ | 0 | 15 | 4 | 0 | 15 | $10\frac{1}{2}$ | 0 | 16 | $5\frac{1}{4}$ | 0 | 16 | $11\frac{1}{4}$ | 0 | 17 | $6\frac{1}{4}$ |
| 300 | 1 | 0 | $6\frac{1}{2}$ | 1 | 1 | $4\frac{1}{4}$ | 1 | 2 | $2\frac{1}{4}$ | 1 | 3 | 0 | 1 | 3 | 10 | 1 | 4 | $7\frac{3}{4}$ | 1 | 5 | $5\frac{3}{4}$ | 1 | 6 | $3\frac{1}{2}$ |
| 400 | 1 | 7 | $4\frac{3}{4}$ | 1 | 8 | $5\frac{3}{4}$ | 1 | 9 | 7 | 1 | 10 | 8 | 1 | 11 | $9\frac{1}{4}$ | 1 | 12 | $10\frac{1}{2}$ | 1 | 13 | $11\frac{1}{2}$ | 1 | 15 | $0\frac{3}{4}$ |
| 500 | 1 | 14 | $2\frac{3}{4}$ | 1 | 15 | $7\frac{1}{4}$ | 1 | 16 | $11\frac{3}{4}$ | 1 | 18 | $4\frac{1}{4}$ | 1 | 19 | $8\frac{1}{2}$ | 2 | 1 | 1 | 2 | 2 | $5\frac{1}{2}$ | 2 | 3 | 10 |
| 800 | 2 | 14 | $9\frac{1}{2}$ | 2 | 16 | $11\frac{3}{4}$ | 2 | 19 | 2 | 3 | 1 | $4\frac{1}{4}$ | 3 | 3 | $6\frac{1}{2}$ | 3 | 5 | 9 | 3 | 7 | $11\frac{1}{4}$ | 3 | 10 | $1\frac{1}{2}$ |
| 1000 | 3 | 8 | $5\frac{3}{4}$ | 3 | 11 | $2\frac{3}{4}$ | 3 | 13 | $11\frac{1}{2}$ | 3 | 16 | $8\frac{1}{2}$ | 3 | 19 | $5\frac{1}{4}$ | 4 | 2 | $2\frac{1}{4}$ | 4 | 4 | 11 | 4 | 7 | 8 |

## INTEREST TABLE,—(*Continued.*)

| Prin. | 1 month. | | | 2 months. | | | 3 months. | | | 4 months. | | | 5 months. | | | 6 months. | | | 7 months. | | | 8 months. | | | 9 months. | | | 10 months. | | | 11 months. | | | 12 months. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| £ | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. |
| 1 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 3 | 0 | 0 | 4 | 0 | 0 | 5 | 0 | 0 | 6 | 0 | 0 | 7 | 0 | 0 | 8 | 0 | 0 | 9 | 0 | 0 | 10 | 0 | 0 | 11 | 0 | 1 | 0 |
| 2 | 0 | 0 | 2 | 0 | 0 | 4 | 0 | 0 | 6 | 0 | 0 | 8 | 0 | 0 | 10 | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 1 | 4 | 0 | 1 | 6 | 0 | 1 | 8 | 0 | 1 | 10 | 0 | 2 | 0 |
| 3 | 0 | 0 | 3 | 0 | 0 | 6 | 0 | 0 | 9 | 0 | 1 | 0 | 0 | 1 | 3 | 0 | 1 | 6 | 0 | 1 | 9 | 0 | 2 | 0 | 0 | 2 | 3 | 0 | 2 | 6 | 0 | 2 | 9 | 0 | 3 | 0 |
| 4 | 0 | 0 | 4 | 0 | 0 | 8 | 0 | 1 | 0 | 0 | 1 | 4 | 0 | 1 | 8 | 0 | 2 | 0 | 0 | 2 | 4 | 0 | 2 | 8 | 0 | 3 | 0 | 0 | 3 | 4 | 0 | 3 | 8 | 0 | 4 | 0 |
| 5 | 0 | 0 | 5 | 0 | 0 | 10 | 0 | 1 | 3 | 0 | 1 | 8 | 0 | 2 | 1 | 0 | 2 | 6 | 0 | 2 | 11 | 0 | 3 | 4 | 0 | 3 | 9 | 0 | 4 | 2 | 0 | 4 | 7 | 0 | 5 | 0 |
| 6 | 0 | 0 | 6 | 0 | 1 | 0 | 0 | 1 | 6 | 0 | 2 | 0 | 0 | 2 | 6 | 0 | 3 | 0 | 0 | 3 | 6 | 0 | 4 | 0 | 0 | 4 | 6 | 0 | 5 | 0 | 0 | 5 | 6 | 0 | 6 | 0 |
| 7 | 0 | 0 | 7 | 0 | 1 | 2 | 0 | 1 | 9 | 0 | 2 | 4 | 0 | 2 | 11 | 0 | 3 | 6 | 0 | 4 | 1 | 0 | 4 | 8 | 0 | 5 | 3 | 0 | 5 | 10 | 0 | 6 | 5 | 0 | 7 | 0 |
| 8 | 0 | 0 | 8 | 0 | 1 | 4 | 0 | 2 | 0 | 0 | 2 | 8 | 0 | 3 | 4 | 0 | 4 | 0 | 0 | 4 | 8 | 0 | 5 | 4 | 0 | 6 | 0 | 0 | 6 | 8 | 0 | 7 | 4 | 0 | 8 | 0 |
| 9 | 0 | 0 | 9 | 0 | 1 | 6 | 0 | 2 | 3 | 0 | 3 | 0 | 0 | 3 | 9 | 0 | 4 | 6 | 0 | 5 | 3 | 0 | 6 | 0 | 0 | 6 | 9 | 0 | 7 | 6 | 0 | 8 | 3 | 0 | 9 | 0 |
| 10 | 0 | 0 | 10 | 0 | 1 | 8 | 0 | 2 | 6 | 0 | 3 | 4 | 0 | 4 | 2 | 0 | 5 | 0 | 0 | 5 | 10 | 0 | 6 | 8 | 0 | 7 | 6 | 0 | 8 | 4 | 0 | 9 | 2 | 0 | 10 | 0 |
| 20 | 0 | 1 | 8 | 0 | 3 | 4 | 0 | 5 | 0 | 0 | 6 | 8 | 0 | 8 | 4 | 0 | 10 | 0 | 0 | 11 | 8 | 0 | 13 | 4 | 0 | 15 | 0 | 0 | 16 | 8 | 0 | 18 | 4 | 1 | 0 | 0 |
| 30 | 0 | 2 | 6 | 0 | 5 | 0 | 0 | 7 | 6 | 0 | 10 | 0 | 0 | 12 | 6 | 0 | 15 | 0 | 0 | 17 | 6 | 1 | 0 | 0 | 1 | 2 | 6 | 1 | 5 | 0 | 1 | 7 | 6 | 1 | 10 | 0 |
| 40 | 0 | 3 | 4 | 0 | 6 | 8 | 0 | 10 | 0 | 0 | 13 | 4 | 0 | 16 | 8 | 1 | 0 | 0 | 1 | 3 | 4 | 1 | 6 | 8 | 1 | 10 | 0 | 1 | 13 | 4 | 1 | 16 | 8 | 2 | 0 | 0 |
| 50 | 0 | 4 | 2 | 0 | 8 | 4 | 0 | 12 | 6 | 0 | 16 | 8 | 1 | 0 | 10 | 1 | 5 | 0 | 1 | 9 | 2 | 1 | 13 | 4 | 1 | 17 | 6 | 2 | 1 | 8 | 2 | 5 | 10 | 2 | 10 | 0 |
| 60 | 0 | 5 | 0 | 0 | 10 | 0 | 0 | 15 | 0 | 1 | 0 | 0 | 1 | 5 | 0 | 1 | 10 | 0 | 1 | 15 | 0 | 2 | 0 | 0 | 2 | 5 | 0 | 2 | 10 | 0 | 2 | 15 | 0 | 3 | 0 | 0 |
| 70 | 0 | 5 | 10 | 0 | 11 | 8 | 0 | 17 | 6 | 1 | 3 | 4 | 1 | 9 | 2 | 1 | 15 | 0 | 2 | 0 | 10 | 2 | 6 | 8 | 2 | 12 | 6 | 2 | 18 | 4 | 3 | 4 | 2 | 3 | 10 | 0 |
| 80 | 0 | 6 | 8 | 0 | 13 | 4 | 1 | 0 | 0 | 1 | 6 | 8 | 1 | 13 | 4 | 2 | 0 | 0 | 2 | 6 | 8 | 2 | 13 | 4 | 3 | 0 | 0 | 3 | 6 | 8 | 3 | 13 | 4 | 4 | 0 | 0 |
| 90 | 0 | 7 | 6 | 0 | 15 | 0 | 1 | 2 | 6 | 1 | 10 | 0 | 1 | 17 | 6 | 2 | 5 | 0 | 2 | 12 | 6 | 3 | 0 | 0 | 3 | 7 | 6 | 3 | 15 | 0 | 4 | 2 | 6 | 4 | 10 | 0 |
| 100 | 0 | 8 | 4 | 0 | 16 | 8 | 1 | 5 | 0 | 1 | 13 | 4 | 2 | 1 | 8 | 2 | 10 | 0 | 2 | 18 | 4 | 3 | 6 | 8 | 3 | 15 | 0 | 4 | 3 | 4 | 4 | 11 | 8 | 5 | 0 | 0 |
| 200 | 0 | 16 | 8 | 1 | 13 | 4 | 2 | 10 | 0 | 3 | 6 | 8 | 4 | 3 | 4 | 5 | 0 | 0 | 5 | 16 | 8 | 6 | 13 | 4 | 7 | 10 | 0 | 8 | 6 | 8 | 9 | 3 | 4 | 10 | 0 | 0 |
| 300 | 1 | 5 | 0 | 2 | 10 | 0 | 3 | 15 | 0 | 5 | 0 | 0 | 6 | 5 | 0 | 7 | 10 | 0 | 8 | 15 | 0 | 10 | 0 | 0 | 11 | 5 | 0 | 12 | 10 | 0 | 13 | 15 | 0 | 15 | 0 | 0 |
| 400 | 1 | 13 | 4 | 3 | 6 | 8 | 5 | 0 | 0 | 6 | 13 | 4 | 8 | 6 | 8 | 10 | 0 | 0 | 11 | 13 | 4 | 13 | 6 | 8 | 15 | 0 | 0 | 16 | 13 | 4 | 18 | 6 | 8 | 20 | 0 | 0 |
| 500 | 2 | 1 | 8 | 4 | 3 | 4 | 6 | 5 | 0 | 8 | 6 | 8 | 10 | 8 | 4 | 12 | 10 | 0 | 14 | 11 | 8 | 16 | 13 | 4 | 18 | 15 | 0 | 20 | 16 | 8 | 22 | 18 | 4 | 25 | 0 | 0 |
| 800 | 3 | 6 | 8 | 6 | 13 | 4 | 10 | 0 | 0 | 13 | 6 | 8 | 16 | 13 | 4 | 20 | 0 | 0 | 23 | 6 | 8 | 26 | 13 | 4 | 30 | 0 | 0 | 33 | 6 | 8 | 36 | 13 | 4 | 40 | 0 | 0 |
| 1000 | 4 | 3 | 4 | 8 | 6 | 8 | 12 | 10 | 0 | 16 | 13 | 4 | 20 | 16 | 8 | 25 | 0 | 0 | 29 | 3 | 4 | 33 | 6 | 8 | 37 | 10 | 0 | 41 | 13 | 4 | 45 | 16 | 8 | 50 | 0 | 0 |

# EXCHANGE.

EXCHANGE teaches to compute how much money of one country is equivalent to a certain sum of another, at a given course of exchange.

Monies of Exchange and of Account are mostly the same. In some places they are imaginary, as the pound sterling, for which there was formerly no corresponding coin; in other places real, as shillings and pence.

The Course of Exchange is the quantity of the money of one country, which is given for a fixed sum of the money of another; the former is called the uncertain price, and the latter the certain price.

The Par of Exchange is the intrinsic value of the money of one country, compared with that of another, both with respect to the weight and fineness.

Agio is the difference between bank and current money; it also means, in those places where foreign coins are current, the difference between the actual value of such coins, and that at which they have been fixed by government.

Usance is the usual time at which bills are drawn between certain places, such as one, two, or three months after date; and double or half usances mean double or half of the usual time. If the usance be one month, fifteen days are allowed for half usance.

The following rule will show when the change is favourable or unfavourable:—

The lower the course of exchange runs, the more favourable it is to the place or people in whose money it is reckoned, and *vice versâ*.

## WITH AMSTERDAM.

There are two kinds of money in Holland, called banco and currency. The former generally bears a small premium called agio, and all bills of exchange are valued and paid in banco.

Accounts are kept in guilders, stivers, and pennings; and also in pounds, shillings, and pence, Flemish.

16 pennings = 1 stiver. (*2d.* Flem.)
20 stivers = 1 guilder or Flor.
2½ guilders = 1 rix dollar.
6 guilders = 1 pound Flemish.

Also,

8 pennings = 1 groat or 1*d.* F.
12 pence = 1 shilling.
20 shillings = 1 pound.

Exchange with London, at so many guilders or florins, or shillings and pence, Flemish, for £1 sterling. Par 36*s.* 1*d.* Flem. per pound sterling.

To reduce banco into currency, and the contrary, say,

As 100 : 100 with the agio added :: banco : currency,
And 100 with the agio added : 100 :: currency : banco.

EXAMPLE.

Reduce 1625 guilders banco into currency; agio at $3\frac{1}{4}$ per cent.

| *ban.* | | *cur.* | | *ban.* |
|---|---|---|---|---|
| 100 | : | $103\frac{1}{4}$ | :: | 1625 |
| | | | | $103\frac{1}{4}$ |
| | | | | 1677.8125 |

Or, 1677 guild. 16 stiv. 4 penn. cur.

Reverse statement for proof.

| $103\frac{1}{4}$ | : | 100 | :: | 1677.8125 |
|---|---|---|---|---|
| 413 | | 400 | | 400 |

413 ) 671125.00000

1625 guilders banco.

WITH HAMBURGH.

Money in Hamburgh is distinguished, as at Amsterdam, into banco and currency. The banco here bears a considerable premium, the agio being from 18 to 25 per cent.; and all the bills of exchange are valued and paid in this money.

WITH PARIS.

Accounts in France are kept in livres, sous, and deniers; and also in francs and cents.

12 deniers = 1 sou or sol.
20 sous = 1 livre tournois.
3 livres = 1 ecu.

Also,

| | |
|---|---|
| 10 centimes | = 1 decime. |
| 10 decimes, or 100 cents | = 1 franc. |
| 80 francs | = 81 livres. |

Thus the franc, or new livre, is equal to 243 deniers; being $1\frac{1}{4}$ per cent. better than the old livre tournois, which is 240 deniers.

Paris exchanges with London, by giving a variable number of francs and centimes for the pound sterling. Par, 25 francs per pound sterling.

To reduce francs, &c. into livres, &c. say,

As 80 : 81 : : francs : livres. Or, add $\frac{1}{80}$.

EXAMPLE.

Reduce 3262 francs 50 centimes into livres.

Add $\frac{1}{80}$ 3262·5

40·78125

Livres 3303·28125

Proof.

3303·28125

80

81 ) 264262·5

Francs 3262·50 centimes.

WITH LISBON.

In Portugal, accounts are generally kept in milrees and rees, and they are distinguished by a mark set between them.

| | |
|---|---|
| 400 rees = 1 crusado. | 4800 rees = 1 moidore. |
| 1000 rees = 1 milree | 6400 rees = 1 joannes. |

Exchange with London at a variable number of pence of 1 milree. Par $67\frac{1}{2}$ sterling per milree.

*Note.*—As rees are thousandth parts of a milree, the computations are best performed by decimals.

EXAMPLE.

Reduce 1360 milrees 125 rees into sterling; exchange 64*d.* per milree.

$\frac{1}{60}$, $\frac{1}{4}$ ) 1360·125

340·03125
22·66875

362·7 = £362 14*s.*

WITH DUBLIN.

Accounts in Ireland are kept in pounds, shillings, and pence, as in England. The par of an English shilling is 1*s.* 1*d.* Irish; and therefore £100 English is equal to £108 6*s.* 8*d.* Irish; but in the course of exchange varies from 6 to 20 per cent. Par, $8\frac{1}{3}$.

| | | £ | *s.* | *d.* | |
|---|---|---|---|---|---|
| A shilling sterling | = | 0 | 1 | 1 | Irish. |
| A pound „ | = | 1 | 1 | 8 | „ |
| A guinea „ | = | 1 | 2 | 9 | „ |

*Note.*—To reduce British sterling into Irish at par, add $\frac{1}{12}$; and to reduce Irish at par into British, deduct $\frac{1}{13}$ from the Irish.

WITH AMERICA.

Accounts are kept in dollars and cents, and America exchanges with London at par, or at so much per cent. either above or below par.

100 cents = 1 dollar. Par, 4*s.* 6*d.* sterling.
40 dollars = 9 pounds sterling.

CURRENCIES OF THE UNITED STATES,

*(With rules for reducing them into Sterling.)*

In New England and Virginia, the dollar is worth 6*s.* currency; therefore,

£133 6*s.* 8*d.* currency = £100 sterling.

To reduce this currency into sterling, deduct $\frac{1}{4}$.

In New York and North Carolina, a dollar is worth 8*s.* currency; therefore,

£179 $\frac{7}{9}$ currency = £100 sterling.

To reduce this currency into sterling, multiply by 9, and divide by 16: or, take $\frac{1}{2}$, and add $\frac{1}{8}$ of that half.

### WITH THE WEST INDIES.

Accounts are kept in pounds, shillings, and pence, currency.

£140 currency = £100 sterling

A hard or Spanish dollar is valued at 6*s.* 8*d.* currency. Bills and dollars generally bear a premium.

## EXTRACTING OF ROOTS.

The root is a number whose continual multiplication into itself produces the power; and is denominated the square, cube, 4th, 5th, root, &c. according as it is, when raised to the 2d, 3d, 4th, 5th, &c. power, equal to that power. Thus 2 is the square root of 4, because $2 \times 2 = 4$; and 4 is the cube root of 64, because $4 \times 4 \times 4 = 64$; and so on.

Although there is no number of which we cannot find any power exactly, yet there may be many numbers of which a precise root can never be determined. But by the help of decimals, we can approximate towards the root to any assigned degree of exactness. The roots which approximate are called surd roots, and those which are perfectly accurate are called rational roots.

Roots are sometimes denoted, as in algebra, by writing the character $\surd$ before the power, with the index of the root against it; thus, the third root of 70 is expressed $\sqrt[3]{70}$, and the second root of it is $\surd$ 70, the index 2 being always omitted when the square or second root is designed.

If the power be expressed by several numbers with the sign + or — between them, a line is drawn from the top of the sign over all the parts of it; thus, the third root 28—13 is $\sqrt[3]{28-13}$. Sometimes roots are designated like powers, with fractional indices; thus, the third root of 5 is $5^{\frac{1}{3}}$, the third root of 19 is $19^{\frac{1}{3}}$, and the fourth root of 40 — 12 is $40-12^{\frac{1}{4}}$, &c.

## EXTRACTION OF THE SQUARE ROOT.

Extracting the square root is finding out such a number, as, being multiplied into itself, the product will be equal to the given number.

As the square root of 81 is 9, consequently, $9 \times 9 = 81$ the given number, as in the following table.

| *Root.* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| *Square.* | 1 | 4 | 9 | 16 | 25 | 36 | 49 | 64 | 81 |

*Rule.*—1. Point the given number or resolvend into periods of two figures each, beginning at the unit's place.

2. Find by the table the greatest square number that is contained in the first period towards the left hand, placing the square number under the first period, and the root of it in the quotient, (as in division;) subtract that square out of the said period, and to the remainder bring down the next period for a dividend.

3. Double the quotient or root, and place it for a divisor; seek how often the divisor is contained in the dividend (reserving always the unit's place), and put the answer in the quotient, and also on the right hand of the divisor. Then multiply the divisor by the last figure put in the quotient (as in common division); the product subtract from the dividend, and to the remainder bring down the next period, which proceed with as before.

*Note.*—But if it happen that the given resolvend is not a perfect square, cube, &c. then something will remain after extraction has been made throughout all the points. When this is the case, you must annex ciphers, according as the proposed power requires, namely, by pairs or twos in the square; threes in the cube, &c.; and the operation is continued as before. If the given resolvend consists of a whole number and decimals together, make the number of decimals even by adding ciphers to them.

EXAMPLE.

It is required to extract the square root of 74770609.

74770609 ( 8647 *the root.*
64

166 ) 1077
996 = 166 × 6

1724 ) 8106
6896 = 1724 × 4

17287 ) 121009
121009 = 17287 × 7

*Proof thus,* 8647 × 8647 = 74770609.

## USE OF THE SQUARE ROOT.

To find the side of a square equal in area to any given superficies. Extract the square root of the given superficies; which root will be the side of the square sought.

### EXAMPLE.

If the area of a given circle is 4276·5, what is the side of a square whose superficial content shall be equal to it?

Thus, $\sqrt[3]{}$ 4276·5 = 65·4 *nearly*.

## EXTRACTION OF THE CUBE ROOT.

To extract the cube root is to find out a number, which being multiplied into itself, and then again into the product, produces the given number.

*Table.*

| *Root.* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| *Cube.* | 1 | 8 | 27 | 64 | 125 | 216 | 343 | 512 | 729 |

As the cube root of 729 is 9, consequently 9 × 9 × 9 = 729, the given number; and so of others, as in the above table.

*Rule.*—Make a point over every third figure given, beginning at the unit's place; seek the greatest cube to the first point on the left hand, (by the table,) whose root place in the quotient; then subtract its cube from the period, and to the remainder (if any,) bring down the three figures, or your next period, and call it your dividend.

Find a divisor, by calling your quotient figure, with a cipher joined to it, *r*; then three times the square of *r* will be your divisor; seek how often it is contained in the dividend, and put the answer in the quotient as in division; only with this difference, call the said quotient figure last put up *e*, and multiply your divisor by it, and place the product underneath the dividend; then multiply the square of *e* by three times *r*, and place it under the dividend.; lastly, cube the figure you call *e*, and place it under the dividend: then add the three products together, and it gives the subtrahend; which subtract from your last dividend, and to the remainder bring down the next period, and proceed as before.

EXAMPLE.

What is the cube root of 21024576?

21024576 ) 276 *the root.*
8

$3rr = 1200$ ) 13024

8400 = $3ree$
2940 = $3ree$ } Here $r = 20$, and $e = 7$.
343 = $eee$

11683 *Subtrahend.*

$3rr = 218700$ ) 1341576 *Dividend.*

1312200 = $3ree$
29160 = $3ree$ } Here $r = 270$, and $e = 6$.
216 = $eee$

1341576 *Subtrahend.*

## USE OF THE CUBE ROOT.

To find the side of a cube that shall be equal in solidity to any given solid, as a globe, cylinder, prism, cone, &c. Extract the cube root of the solid content of the given body, which root will be the side of the cube required.

EXAMPLE.

Suppose a stone of a cubic form, which contains 219 solid feet; what is the superficial content of one of its sides?

First, $\sqrt[3]{21952} = 28$, *side of the cube.*

Then, $28 \times 28 = 784$, *the content required.*

## SECTION III.—MENSURATION.

MENSURATION is sometimes considered as belonging to geometry, and with some propriety, as all its rules are founded on geometrical principles. As it would, however, exceed the limits of this work to enter fully into the subject in this point of view, we shall chiefly consider it in a practical manner, in its relation to arithmetic, to which it also properly belongs; though it will be needful, in order to understand the grounds of its operations, previously to lay down the first principles of geometry.

Geometry was originally no more than the art of measuring the earth; but at present it denotes the science of magnitude in general. Herodotus and Proclus ascribe the invention of geometry to the Egyptians, and assert that the annual inundations of the Nile gave occasion to it; for those waters bearing away the bounds and landmarks of estates and farms, covering the face of the ground uniformly with mud, the people, say they, were obliged every year to distinguish and lay out their lands by the consideration of their figure and quantity; and thus by experience and habit they formed a method, or art, which was the origin of geometry.

Geometry is distinguished into theoretical or speculative, and practical.

Theoretical or speculative geometry treats of the various properties and relations of magnitudes, demonstrating the theorems, &c.; and practical geometry is that which applies those speculations and theorems to particular uses in the solution of problems, and to the measurements in the ordinary concerns of life.

The usefulness of geometry extends to almost every art and science. By its help, astronomers turn their observations to advantage, regulate the duration of times, seasons, years, cycles, and epochas; and measure the distance, motions, and magnitudes of the heavenly bodies. By it geographers determine the figure and magnitude of the earth, and delineate the extent and bearings of kingdoms, provinces, harbours, &c. It is from this science, too, that architects derive their just measures in the construction of edifices. It is by the assistance of geometry that engineers conduct all their works, take the situation and plans of towns, the distances of places, and the measure of such things as are only accessible to the sight. It is not only an introduction to fortification, but also highly necessary to most mechanical arts, as carpentry, joinery, &c.

## GEOMETRICAL DEFINITIONS.

1. A point is that which has no parts or magnitude.

2. A line is length conceived without breadth.

3. A right line is the shortest that can be drawn between two given points, it being what is commonly called a straight line.

A curve or curved line is any other than a right line, from which it differs by inflection, either regular or irregular.

4. A superficies, or surface, is considered as an extension of length and breadth, without depth.

5. A plane superficies is a flat surface, which will coincide, in every point, with a right line.

6. A plane figure, scheme, or diagram, is the lineal representation of any object on a plane surface. If the lines forming the figure be straight, the figure is said to be rectilineal, being composed of right lines.

7. An angle is the space or corner between two lines meeting in a point. It is expressed by three letters, as A B C; and the middle letter, as B, always denotes the vertex or angular point.

8. Converging lines are right lines so inclined to each other as to meet, if continued or produced to a certain point.

9. Right and oblique angles. If one right line stands upon another, so as to make the angles on each side equal, each angle is called a right angle, and the line which stands upon the base, or lower line, is called a perpendicular.

10. An acute angle is less than a right angle.

11. An obtuse angle is greater than a right angle.

12. A plane triangle is a space inclosed by three right lines.

13. A right angled triangle is that which has one right angle.

14. An acute angled triangle is a triangle which has all its angles acute.

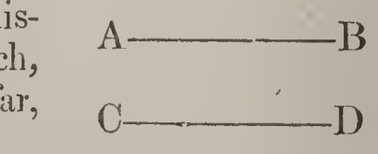
15. An obtuse angled triangle is a triangle having one obtuse angle.

16. An equilateral triangle is a triangle having all its sides equal.

17. An isosceles triangle is a triangle having two equal sides.

18. A scalene triangle is a triangle having no two of its sides equal.

19. Parallel lines are lines equally distant from each other in all parts, and which, though produced or continued ever so far, could never meet.




20. A parallelogram is a figure of which the opposite sides are parallels.

21. When the parallelogram has a right angle, it is called a rectangle.

22. If the sides of the rectangle be equal, it is called a square.

23. If the two adjacent sides be unequal, the rectangle is termed an oblong.

24. If only two opposite angles of a parallelogram be equal, the figure is called a rhombus.

25. If two adjacent sides of a rhombus be equal, the figure is called a rhomboid.

26. Every figure, inclosed by four right lines, is called a quadrangle, or quadrilateral.

27. When all the sides of a quadrilateral are unequal, it is called a trapezium.

28. If two sides of a trapezium be parallel, it is called a trapezoid.

29. Figures having equal sides and equal angles, or equilateral and equiangular figures, formed by more than four right lines, are called regular polygons.

30. A regular polygon of five sides is called a pentagon.

31. A regular polygon of six sides is called a hexagon.

32. A regular polygon of seven sides is called a heptagon.

33. A regular polygon of eight sides is called an octagon; of nine sides, an eneagon or nonagon; of ten sides, a decagon; of eleven sides, a undecagon; of twelve sides, a duodecagon; of fifteen sides, a quindecagon: but polygons having more than twelve sides are commonly expressed as such, with the numbers of sides.

34. A circle is a plane figure formed by one uniform curved line only, which is called its circumference.

35. The centre of a circle is the point in the middle of it; and a line drawn from the centre to the circumference, is the radius of the circle: all lines, (radii,) thus drawn, are equal.

36. The diameter of a circle is a right line drawn through the centre, and terminated on both sides by the circumference.

37. A chord of a circle is a right line drawn from one point of a circle to another, and dividing it into unequal or equal parts, or segments. In the latter case, the chord is also the diameter.

38. A semicircle is one-half of a circle, as divided into two equal parts by the diameter.

39. A segment of a circle is that portion which is cut off by the chord.

40. A sector is the portion of a circle formed by two radii and the intercepted part of the circumference.

41. A quadrant is the fourth part or quarter of a circle; or, in other words, a sector contained by two radii, forming a right angle at the centre, and intercepted part of the circumference.

42. An arc or arch is any portion of the circumference of a circle.

43. The altitude of a figure is a right line drawn from the top or vertical angle perpendicular to the base or opposite side, or to the base produced or continued.

44. A solid is that which has length, breadth, and thickness.

45. A cube is a solid bounded by six equal squares.

46. A prism is a solid whose sides are parallelograms, and whose two ends are parallel to each other.

47. A cylinder is a round solid, like the rolling stone of a bowling-green, whose two ends are equal and parallel circles.

48. A pyramid is a solid, whose base is a polygon, or right-lined figure, and whose sides, or triangles, meet in a point, called the vertex.

49. A cone is a round pyramid, or pyramid having a circular base, in form like a sugar-loaf.

50. A frustrum of a pyramid or cone is that part which remains, when any part next the vertex is cut off by a plane parallel to the base.

51. A pavilion is a solid contained under five planes; the base is a rectangle or oblong, and the four sides terminate in a ridge, parallel to a side of the base, but unequal to it.

52. A prismoid is a solid contained under six planes: the bases or ends are parallel rectangles, and the four sides are quadrangles.

53. A sphere is a solid bounded by a convex surface, every point of which is equally distant from a point within, called the centre.

54. A spheroid is a solid resembling an egg, and is the body conceived to be generated by the revolution of an ellipse about its axis, and is denominated either prolate (oblong) or oblate, according as the revolution is made about the transverse axis or its conjugate. The axis about which the revolution is made is the fixed axis, the other is the revolving axis.

Having thus laid down some of the leading geometrical principles, we now proceed to the application of them arithmetically to the mensuration of bodies.

Mensuration, as applied to practical purposes, is of three kinds—lineal, or as it is often called, running measure; superficial, or square measure; and solid, or cubic measure: the first respects length only; the second, length and breadth; and the third, length, breadth, and depth or thickness. The former only requires the application of the rules already laid down in a former part of this chapter. See WEIGHTS AND MEASURES. We proceed to some rules for the two latter.

## SUPERFICIAL MEASURE.

CASE I.—To multiply feet, inches, and parts, by feet, inches, and parts. This method is termed cross multiplication, but more properly duodecimals.

*Rule.*—Set the feet in the multiplier under the least denomination in the multiplicand, and the rest in order, beginning with the least denomination; divide each product by 12, as you go on; place the first remainder under the multiplying figure,

and the rest in order, adding each quotient to the next arising product; and having finished the multiplication, the sum of all will be the product required.

EXAMPLE.

Multiply 47 feet 8 inches, by 8 feet 4 inches.

| | *feet* | ′ | ″ |
|---|---|---|---|
| Multiply | 47 | 8 | 0 |
| by | | 8 | 4 |
| | 15 | 10 | 8 |
| | 381 | 4 | 0 |
| *Answer*, | 397 | 2 | 8 |

Case II.—To find the area of a parallelogram, whether it be a square, a rectangle, a rhombus, or a rhomboides. Multiply the length by the height or perpendicular breadth, and the product will be the area.

If the area of a piece of ground, in yards, be divided by 4840 (the number of square yards in one acre) the quotient will give the number of acres in the said piece; or, if the area in links be divided by 100,000 (the number of square links in one acre) the quotient will give acres.

EXAMPLE.

What is the area in acres of a parallelogram, whose length is 14·5 chains, and its breadth 9·75 chains?

Here, $E\ F = 14{\cdot}5$, and $E\ C = 9{\cdot}75$ chains.

Then, $14{\cdot}5 \times 9{\cdot}75 = 141{\cdot}375 = 141a.\ 1r.\ 20p.$ the area required.

Case III.—To find the area of a triangle.—1. Multiply one of its sides by the perpendicular let fall upon it from its opposite angle, and half the product will be the area. 2. Multiply the base by half the perpendicular, or the perpendicular by half the base, and the product gives the area.

EXAMPLE

How many acres are in a triangular field, whose base is 28, and perpendicular 20·5 chains?

Here, $A\ C = 28$, and $B\ D = 20{\cdot}5$ chains.

Then, $\frac{28 \times 20{\cdot}5}{2} = 14 \times 20{\cdot}5 = 287$ acres, *Answer.*

CASE IV.—To find the area of any regular polygon. Let fall a perpendicular from the centre of the figure to one of its sides; then multiply together the perpendicular, the side of the figure, and the number of its sides; and half the product will be the area.

EXAMPLE.

What is the area of a regular pentagon, whose sides are 48 feet, and which measures from the centre to the middle of one of its sides 41·57 feet?

Here, $A\ B = 48$, $C\ H = 41{\cdot}57$, and $n = 5$.

Then, $\frac{48 \times 41{\cdot}57 \times 5}{2} = \frac{9976{\cdot}8}{2} = 4988{\cdot}4$ feet, the area required.

CASE V.—To find the diameter and circumference of a circle, the one from the other. Multiply the diameter by 3·1416, and the product will be the circumference. And therefore divide the circumference by 3·1416, and the quotient will be the diameter.

EXAMPLE.

If the diameter of a circle be 7, what is the circumference?

Thus, $3{\cdot}1416 \times 7 = 21{\cdot}9912$, or rather 22, the circumference required.

CASE VI.—To find the area of a circle, multiply half the circumference by half the diameter, and the product will be the area.

EXAMPLE.

How many square feet are in a circle, whose circumference is 6·2832?

$$C = 6{\cdot}2832,\ D = \frac{6{\cdot}2832}{3{\cdot}1416} = 2, \text{ the diameter.}$$

$$\text{Then, } \frac{6{\cdot}2832}{2} \times \frac{2}{2} = \frac{6{\cdot}2832}{2} = 3{\cdot}1416, \text{ the area.}$$

## SOLID MEASURE.

CASE I.—To find the solidity of a cube, prism, or right cylinder. Multiply the area of the base into the height of altitude, and the product will be the solidity.

EXAMPLE.

What is the solid content of a cube, whose side is $2\frac{1}{2}$ feet?

Thus, $2{\cdot}5 \times 2{\cdot}5 \times 2{\cdot}5 = 15{\cdot}623$ feet, the solidity.

CASE II.—To find the surface of a sphere or globe, or of any segment or zone of it. Multiply the circumference of the sphere into the diameter or height of the part required; and the product will be the curve surface, whether it be segment, zone, hemisphere, or the whole sphere.

The height of the whole sphere is its diameter.

EXAMPLE.

What is the surface of a globe, whose diameter is 7?

First, (by Case V.) $3{\cdot}1416 \times 7 = 21{\cdot}9912$, the circumference.
Then, $21{\cdot}9912 \times 7 = 153{\cdot}9384$, the surface required.

CASE III.—To find the solidity or content of a sphere or globe, find the superficies by the last problem; multiply the superficies by $\frac{1}{3}$ of the radius, or by $\frac{1}{6}$ of the diameter; or multiply the cube of the diameter by ·5236, and the product will be the solidity.

EXAMPLE.

What is the content of a globe, whose diameter is 7?

Thus, $7 \times 7 \times 7 \times {\cdot}5236 = 179{\cdot}5948$, the solidity required.

## ARTIFICERS' WORK.

### GLAZIERS' WORK.

Glaziers' work is usually measured by the foot

If the windows be square, multiply the length by the breadth, which will produce the content.

EXAMPLE.

| *feet* | *in.* | | | *feet* | *in.* | |
|---|---|---|---|---|---|---|
| 8 | 9 | high | | 8 | 9 | |
| 7 | 3 | broad | | | 7 | feet 3 inches. |
| 56 | 0 | | | 61 | 3 | |
| 2 | 0 | | 3 inches $\frac{1}{4}$ | 2 | $2\frac{1}{4}$ | |
| 5 | 3 | | | 63 | $5\frac{1}{4}$ | |
| | $2\frac{1}{4}$ | | | | | |
| 63 | $5\frac{1}{4}$ | | | | | |

If the windows be arched, or have a curved form, no allowance is made in charging, although they are actually less in measure, by reason of the extraordinary trouble and waste of time, expense, or waste of glass, &c.; and the dimensions taken from the highest part of the arch, down to the bottom of the window, form the height or length; which multiply by the breadth, and the product will be the answer in feet, &c.

## PAINTERS' WORK.

Painters' work is usually measured by the yard.

When the wainscot of a room is painted, the room must be measured with a line, and the height taken by girting a string over all the mouldings from the top of the cornice to the floor: then multiply the compass by the height, and you have the content in feet and inches; which may be reduced into square yards by dividing by 9.

EXAMPLE.

How many square yards are there in the painting of a room which is 45 feet 8 inches in compass, and 10 feet 6 inches high?

| *feet* | *in.* | |
|---|---|---|
| 45 | 8 | in compass. |
| 10 | 6 | high. |
| 456 | 8 | |
| 22 | 10 | |
| 9)479 | 6 | |
| Yards 53 | 2 | 6 *Answer.* |

## JOINERS' WORK.

In wainscoting, the dimensions are taken as in painting, that is by measuring the height and the compass; which multiply one into the other, dividing the product by nine, and the quotient is the answer in square yards.

EXAMPLE.

What is the content of a piece of wainscoting that is 9 feet 3 inches long, and 6 feet 6 inches broad?

| | *feet* | *in.* | |
|---|---|---|---|
| 6 inches is $\frac{1}{2}$—2 ) | 9 | 3 | |
| | | 6 | feet 6 inches. |
| | 55 | 6 | |
| | 4 | $7\frac{1}{2}$ | |
| 9 ) | 60 | $1\frac{1}{2}$ | |
| | 6 yds. $\frac{2}{3}$ | | *Answer.* |

## CARPENTERS' WORK.

Roofing, flooring, and partitioning, by the principal carpenters, in modern buildings, are measured by the square of 10 feet each way, that is, 100 square feet.

For roofing, multiply the depth and half depth by the front, or the front and half front by the depth, and you will have the content.

The dimensions are taken in feet and inches.

EXAMPLE.

How many squares does a piece of work contain that measures 199 feet 10 inches in length, and 10 feet 7 inches in height?

| | *feet* | *in.* | |
|---|---|---|---|
| | 199 | 10 | long. |
| | | 10 | feet 7 inches high. |
| | 1998 | 4 | |
| 6 inches $\frac{1}{2}$ | 99 | 11 | |
| 1 inch $\frac{1}{6}$ | 16 | $7\frac{5}{6}$ | |
| | 21 14 | $10\frac{5}{6}$ | |

*Answer*, 21 squares, 14 feet, $10\frac{5}{6}$ inches.

The division is performed by pointing off two places towards the right hand; and the number on the left is the squares, &c.

## SAWYERS' WORK.

Sawyers' work is measured by the superficial foot, and paid for by the hundred, that is, 100 feet; the depth of the kerf is reckoned for the breadth, and the length for the length. The dimensions being taken in feet, the content of feet one kerf superficial may be found by multiplying the length by the breadth; and then having found the number of feet in one kerf, multiply it by the number of kerfs of the same dimensions, and you will have the number of feet in them all.

## BRICKLAYERS', TILERS', AND SLATERS' WORK.

Walling is measured by the rod statute-measure, being $272\frac{1}{4}$ feet superficial. The method of taking the dimensions is this:—Measure the length by a line going over the buttresses; and for the height, measure over the mouldings, pressing the line into them even to the middle of the coping. The thickness of the wall is calculated by the number of half bricks in length the wall is in thickness; for three half bricks, that is, a brick in length and one in breadth, is the standard thickness: and all walls, whether less or more, must be reduced to that thickness, by the rule following:

Multiply the product of the length and height by the number of half bricks that the wall is in thickness; which product divide by 3, and then the quotient by 272 (the $\frac{1}{4}$ being generally neglected in common working); and the quotient will be rods, at a brick and a half thick, standard measure.

### EXAMPLE.

Admit the face of a wall to measure 4085 feet, and the thickness to be two bricks and a half, or five half bricks, how many rods does it contain?

*feet.*
4085
5
3)20425
272)6808 (25 rods, *Answer.*
544
1368
1360
8

Tylers' and Slaters' work is valued by the square of 100 feet; in some places by the rod of 18 feet square; that is, 36 square yards, or 324 feet.

Masons' work, consisting of stone, is of two sorts, namely, superficial and solid. Pavements, and the face of stone walls, houses, &c. are measured as brick-work. If the work have ornaments, as capitals, pilasters, rails, balusters, &c. then they are valued by the piece.

## LAND MEASURE.

Land is usually measured by the acre. The dimensions are taken with a chain of four poles in length, which is divided into a hundred parts, called links; and ten square chains make an acre. But to find the content (if not regularly square) it is generally divided into triangles: thus, a piece of land of 4 sides (if not square) may be divided into two triangles; pieces of 5 sides into 3, &c.; but if square, it is measured as a regular parallelogram. See Case II.

All other pieces of land must be divided into triangles, each of which must be measured and their contents added together. See Case III. Superficial Measure.

## TIMBER MEASURE.

To find the solid content of a tree, it must first be girted, and one-fourth part taken for the side of the square; then multiply the length of the side of the square in inches into itself, and that product by the length in feet; which last product divide by 144: but if you multiply by the length in inches, then the divisor must be 1728, and if any thing remain, divide such remainder by 12, and the quotient will be the odd inches.

### EXAMPLE.

Suppose a piece of timber 15 feet long, and a quarter of the girt 42 inches; what is the content of that piece?

*in.* *in.* *feet.*
$42 \times 42 = 1764 \times 15 = 26460 \div 144 = 183$ feet, 9 in. *Answer.*

## GAUGING.

There is some sort of affinity between measuring timber and gauging or measuring liquors. In both cases the number of solid

or cubic inches is first found, and in gauging, the number of gallons is afterwards found by dividing by 282 if beer or ale, and by 231 if wine measure.

To gauge a copper, tub, or cask, if it be wider at the top than the bottom, take the diameter somewhat above the middle; or if it be unequal, find the mean diameter of the bung and the head; then square the mean diameter, and multiply that square by .7854, and the product will give the content at one inch deep; which, multiplied by the length, will give the number of solid inches.

EXAMPLE.

What is the content of a cask whose mean diameter is 72 inches, and its length 56 inches.

$$72 \times 72 = 5184 \times .7854 = 4071{\cdot}5136 \times 56 = 228004{\cdot}7616$$
$$\div 282 = 808\tfrac{1}{2} \text{ gallons, } \textit{Answer}.$$

## Section IV.—Algebra.

This term is taken from the Arabic language, and signifies in general the art of comparing and equalizing quantities, and of resolving questions in arithmetic, where these operations are required, by means of general signs and characters. Algebra is applied to the resolution of all kinds of problems wherein quantity is concerned; for which purpose, it does not require that rules should be previously laid down, but teaches how to discover or invent them, and that by the force of reasoning, from a bare contemplation of the conditions and relations of the quantities, as expressed in the problem under consideration. Algebra likewise shows how to demonstrate or prove the rules, theorems, and conclusions, thus investigated.

Soon after the invention of this art, numbers and things were expressed by their names at full length; but afterwards these were abridged, and the initials of the words used instead of them; and, as the art advanced farther, the letters of the alphabet came to be employed as general representations of all kinds of quantities; and other marks were gradually introduced to express the operations and combinations, so as to entitle it to different appellations. It is highly probable that the Indians or Arabians first invented this noble art, for it may be reasonably supposed that the ancient Greeks were ignorant of it, since Pappus, in his mathematical collections, in which he enumerates their analysis, makes mention

of nothing like it; and he besides speaks of a local problem, begun by Euclid, and continued by Apollonius, which none of them could fully resolve, a circumstance that could not have occurred had they been acquainted with algebra.

Diophantus was the first Greek writer on algebra; he published thirteen books about the year 800, though only six of them were translated into Latin in the year 1575. This algebra of Diophantus only extends to the solution of arithmetical indeterminate problems. Before this translation of Diophantus came out, Lucas de Burgo, a friar, published at Venice, in the year 1494, an Italian treatise on algebra. This author refers to others who had preceded him, and from whom he had learned the art; but their writings have not come down to us. He also assumes, that algebra came originally from the Arabs, and never mentions Diophantus, which makes it highly probable that his work was not even then known in Europe. Burgo's treatise goes no farther than quadratic equations. He was succeeded by Stifelius, who was a good author, but did not advance the science. After him came Scipio Ferreus, Cardan, Tartagilla, and some others, who proceeded to the solution of cubic equations.

In 1590, Vieta introduced his specious arithmetic, which consists in denoting the quantities, both known and unknown, by symbols or letters. To Vieta we are indebted for the method of extracting the roots of equations by approximations, which has been since greatly improved by Raphson, Halley, Maclaurin, Simpson, and others.

The elements of the art were compiled and published by Kersey, in 1671, in which specious arithmetic, and the nature of equations are largely explained, and illustrated by a variety of examples. Sir Isaac Newton's "Arithmetica Universalis" was published in 1707, which abounds with useful and important instruction; and since his time we have had a great number of excellent treatises on the subject, from almost any of which the science may with very little difficulty be learned. Algebra is called an universal arithmetic, and it proceeds by operations and rules similar to those in common arithmetic, founded upon the same principles. But as a number of symbols are admitted into this science, being necessary for giving it that extent and generality which is its greatest excellence; the import of these symbols is to be clearly stated, that no obscurity or error may arise from the frequent use and complication of them. Thus,—

The relation of equality is expressed by the sign, $=$; thus, to express that the quantity represented by $a$ is equal to that which is represented by $b$, we write $a = b$. But if we would express

that $a$ is greater than $b$, we write $a \rhd b$; and if we would express algebraically that $a$ is less than $b$, we write $a \lhd b$.

Quantity is what is made up of parts, or is capable of being greater or less. It is increased by addition, and diminished by subtraction; which are therefore the two primary operations that relate to quantity. Hence it is, that any quantity may be supposed to enter into algebraic computations two different ways, which have contrary effects; either as an increment, or as a decrement; that is, as a quantity to be added, or as a quantity to be subtracted. The sign + (plus) is the mark of addition, and the sign − (minus) of subtraction. Thus, the quantity being repre- by $a$, or $+ a$, imports that $a$ is to be added, or represents an increment; but $-a$ imports that $a$ is to be subtracted, and represents a decrement. When several such quantities are joined, the signs serve to show which are to be added, and which are to be subtracted. Thus, $+ a + b$ denotes the quantity that arises when $a$ and $b$ are both considered as increments, and therefore expresses the sum of $a$ and $b$. But $+ a - b$ denotes the quantity that arises, when from the quantity $a$, the quantity $b$ is subtracted; and expresses the excess of $a$ above $b$. When $a$ is greater than $b$, then $a - b$ is itself an increment; when $a = b$, then $a - b = o$; and when $a$ is less than $b$, then $a - b$ is itself a decrement.

As addition and subtraction are opposite, or an increment is opposite to a decrement, there is an analogous opposition between the affections of quantities that are considered in the mathematical sciences. As between excess and defect; between the value of effects or money due to a man, and money due by him; a line drawn towards the right, and a line drawn to the left; gravity and levity; elevation above the horizon, and depression below it. When two quantities equal in respect of magnitude, but of those opposite kinds, are joined together, and conceived to take place in the same subject, they destroy each other's effect, and their amount is nothing. Thus £100 due to a man, and £100 due by him, balance each other; and in estimating his stock may be both neglected.

A quantity that is to be added is likewise called a positive quantity; and a quantity to be subtracted is said to be negative: they are equally real, but opposite to each other, so as to take away each other's effect, in any operation, when they are equal as to quantity. Thus, $3 - 3 = 0$, and $a - a = 0$. But though $+ a$ and $- a$ are equal as to quantity, we do not suppose in algebra that $+ a = - a$; because, to infer equality in this science, they must not only be equal as to quantity, but of the

same quality, that in every operation the one may have the same effect as the other. A decrement may be equal to an increment; but it has in all operations a contrary effect. It is on account of this contrariety, that a negative quantity is said to be less than nothing, because it is opposite to the positive, and diminishes it when joined to it, whereas the addition of 0 has no effect. But a negative is to be considered no less as a real quantity than the positive. Quantities that have no sign prefixed to them are understood to be positive.

The number prefixed to a letter is called the number coefficient, and shows how often the quantity represented by the letter is to be taken. Thus, $2a$ imports that the quantity represented by $a$ is to be taken twice; $3a$, that it is to be taken thrice, and so on. When no number is prefixed, unit is understood to be the coefficient. Thus, 1 is the coefficient of $a$ or of $b$. Quantities are said to be like or similar, that are represented by the same letter, or letters equally repeated. Thus, $+ 3a$, and $- 5a$ are like; but $a$ and $b$, or $a$ and $aa$ are unlike. A quantity is said to consist of as many terms as there are parts joined by the signs $+$ or $-$; thus, $a + b$ consists of two terms, and is called a binomial; $a + b + c$ consists of three terms, and is called a trinomial. These are called compound quantities: a simple quantity consists of one term only, as, $+ a$, or $+ ab$, or $+ abc$.

## ADDITION.

Addition in algebra is performed in several ways.

Case I.—When the questions are like and have similar signs.

*Rule.*—Add together the coefficient, (counting a quantity having no coefficient as *one*,) and annex the common letter or letters, prefixing the common sign.

EXAMPLES.

| No. 1. | No. 2. |
|---|---|
| $+ 5m$ | $- 96xz$ |
| $+ 3m$ | $- 7xz$ |
| $+ m$ | $- xz$ |
| $+ 9m$ | $- 32xz$ |
| $+ 8m$ | $- 18xz$ |
| $+ 26m$ | $- 154xz$ |

CASE II.—When the quantities are *like*, but the signs *unlike*.

*Rule.*—Add all the positive quantities together, and all the negative quantities; and the difference between these sums is the amount of the whole, having the sign belonging to the greatest sum.

EXAMPLES.

| No. 1. | No. 2. |
|---|---|
| $+ 8a$ | $+ 9n - 8$ |
| $- 2a$ | $- 6n + 2$ |
| $- 7a$ | $+ 24n - 5$ |
| $+ 9a$ | $- 4n + 13$ |
| $+ 17a$ sum of $+$ | $+ 33n + 15$ |
| $- 9a$ sum of $-$ | $- 10n - 13$ |
| $+ 8a$ total | $+ 23n + 2$ |

EXPLANATION

To understand these examples, we may take the positive quantities as representing the several articles of a person's effects, and the negative quantities as his debts: in this case, it is evident that, to know the true state of his affairs, we must deduct the debts from the effects, and the remainder will be his real property, equal to the complex amount of all the positive and negative quantities taken together. Thus, in the first example we have $+ 8a$ and $+ 9a$, amounting to $+ 17a$ for the effects, $- 2a$, and $- 7a$, amounting to $- 9a$ for the debts; which last sum, taken from the former, will leave $+ 8a$ for the value of the remaining property.

CASE III.—When the quantities to be added are all unlike.

*Rule.*—Write down the quantities in succession, with their respective signs and coefficients, in one line.

EXAMPLES.

| No. 1. | No. 2. |
|---|---|
| $24a$ | $cd - m$ |
| $- 9m$ | $3no + 54yz$ |
| $8n$ | $cd - m + 3no + 54yz.$ |
| $x$ | |
| $24a - 9m + 8n + x$ | |

## SUBTRACTION.

SUBTRACTION in algebra is performed by changing the sign of the quantity to be subtracted, and then adding the two quantities together, as before shown.

EXAMPLES.

| No. 1. | No. 2. |
|---|---|
| $12b + 8d$ | $9m - 8n + 32$ |
| $7b - 3d$ | $5m - 9n + 48$ |
| $+5b + 11d$ | $4m + n + 16$ |

EXPLANATION.

In the first example, where $7b - 3d$ must be taken from $12b + 8d$, if we change the sign of $7b$, which is $+$ into $-$, and then add the two quantities together by the second rule of addition, we shall have $+5b$: and in subtracting $-3d$ from $+8d$, if we change the $-$ into $+$, and add these quantities together, we shall have $+11d$. Had the question been to take only $7b$ from $12b + 8d$, the remainder would evidently have been $5b + 8d$: but as the sum to be subtracted is *less* than $7b$ by thrice the value of $d$, the remainder must be *greater* than it would have been, on the first supposition, by thrice the value of $d$; that is, it must be $5b + 11d$.

## MULTIPLICATION.

CASE I.—When the quantities to be multiplied have like signs, the sign of the product is $+$; and when they have unlike signs it is $-$. When the given quantities are simple, find the sign of the product by the above rule, to which annex the product of the coefficients, if any, and then all the letters, to make up the product required.

Thus, in the first example following, where the quantity $12cd$ is to be multiplied by $9m$, we multiply the coefficients 12 and 9, giving 108 for the coefficient of the product, and write down the letters of both quantities, beginning with the multiplicand, prefixing the sign $+$, because the factors have both the same signs.

EXAMPLES.

| No. 1. | No. 2. | No. 3. |
|---|---|---|
| $+ 12cd$ | $+ 7b$ | $- 8mnx$ |
| $+ 9m$ | $- 5d$ | $- 5noz$ |
| $+ 108cdm$ | $- 35bd$ | $+ 40mnxnoz$ |

Case II.—When the factors are compound quantities, each term of the multiplicand is to be multiplied by each term of the multiplier, and the sum of these several products, collected according to the rules of addition, will be the general product required.

EXAMPLES.

| No. 1. | No. 2. |
|---|---|
| Multiply $m + n$ | $8a + 2c - 4d$ |
| by $m + n$ | $5a$ |
| $mm + mn$ | $40a^2 + 10ac - 20ad$ |
| $mn + nn$ | |
| $mm + 2mn + nn$ | |

EXPLANATION.

In the example No. 1, where the quantity $m + n$ is squared or multiplied into itself, beginning (as is done in multiplying feet and inches by feet and inches, in common arithmetic,) at the left hand with the quantity $m$, this multiplied by the $m$ of the multiplicand gives for a product $mn$. Again, taking $n$ for the multiplier, and going over the multiplicand, we have for a product $mn + nn$, which is set down, beginning under the multiplier $n$: and these two products added together give for the total product $mm + 2mn + nn$. But when any number is multiplied by itself, the product is a square, or the second power of that number; it is therefore usual instead of writing the quantity twice over, $mm$ or $nn$, to set down the root with the second, third, or other power marked over it; hence, instead of $mm + 2mn + nn$, we write $m^2 + mn + n^2$.

In the example No. 2, $8a$ multiplied by $5a$ gives $40a^2$, $5a$ by $2c$ gives $10ac$; and as both these quantities have like signs, the signs of the product are $+$: again, $5a$ by $4d$ gives $20ad$, and the signs being unlike, that of the product is $-$; consequently, the total product is $40a^2 + 10ac - 20ad$.

These algebraic operations may be illustrated and confirmed by common arithmetic in the following manner. In the first example, for instance, let $m$ represent 8, and $n$ 6: then the operation will appear in this shape:—

$$\begin{array}{rr} 8+6 & 8 \\ 8+6 & +6 \\ \hline 64+48 & 14 \\ \quad 48+36 & +14 \\ \hline 64+96+36 = 196 & = 196 \end{array}$$

EXPLANATION.

Here the component parts of the given quantity 8 and 6 are separately multiplied together, and the result is the sum of the products of 8 multiplied by 8, of twice 8 by 6, and of 6 by 6, in all 196, which is the product of 14, the sum of the two parts 8 and 6, multiplied by itself.

## DIVISION.

Division of algebraic quantities is performed agreeably to the following rules; observing that when the signs of the divisor and dividend are like, that of the quotient is +, when unlike, it is −.

Case I.—When the divisor is simple, that is, contains but one term, and appears in each term of the dividend.

*Rule.*—Divide the coefficient of each term of the dividend by the coefficient of the divisor, and expunge or withdraw from each term the letter or letters of the divisor, when the result will be the quotient. Thus, if it be required to divide $25cd$ by $5c$, we divide the coefficient 25 by the other 5, which will give 5 for the coefficient of the quotient: and $cd$ being a product of which the $c$ of the divisor is a factor, this symbol being expunged or taken away, the remaining symbol $d$ will belong to the quotient, which will then be $5d$.

EXAMPLE.

$$5am \,)\, 5a^3m + 25abm - 5am^2 \,(\, a^2 + 5b -$$
$$5a^3m$$
$$+ 25abm$$
$$25abm$$
$$- 5am^2$$
$$5am^2$$

EXPLANATION.

In beginning this operation, the divisor $5am$ is to be taken out of the first term of the dividend $5a^3m$: taking the root $a$ from the third power, we have the second power of $a$ for a term of the quotient; and as 5 is contained once in 5, and $m$ once in $m$, neither of these coefficients (*one*) need to appear in the quotient; they are therefore suppressed or expunged; and the divisor $5am$ being multiplied by the quotient $a^2$, and the product $5a^3m$ written under the dividend is equal to it, and of course no remainder is left. The next term, $25abm$ is then brought down, and the 5 of the divisor being contained 5 times in the 25, 5 is placed as a coefficient in the quotient. Then $am$ is contained $b$ times in $abm$; consequently, $5b$ becomes the term of the quotient corresponding to this step of the division, which term, multiplied into the divisor, gives $25abm$, to be subtracted without a remainder. Lastly comes down the term $-5am^2$, out of which if we take the divisor $+5am$, the quotient must be $-m$: hence, the whole quotient in this operation will be $a^2 + 5b - m$.

The same may be contracted by expunging the characters of the divisor from the dividend; thus,—

$$\begin{array}{l} 5am \,)\, 5a^3m + 25abm - 5am^2 \,( \\ \hline a^2 + 5b - m \end{array}$$

Case II.—When the divisor is simple, but not a factor or portion of any term of the dividend, the quotient must be expressed as a fraction, of which the numerator is the dividend, and the denominator the divisor: thus, $48m$ divided by $9x$ can be expressed only as a fraction, $\frac{48m}{9x}$.

CASE III.—When the divisor is complex, that is, contains more than one term, the first term of the dividend is divided by the first term of the divisor, and the quotient, being put down with the proper sign, is multiplied into the whole of the divisor, for a product to be subtracted from the dividend. If any thing remain, it becomes a new dividend, the first term of which is again divided by the first term of the divisor, and the quotient annexed, with the proper sign, to the foregoing term. Then the whole divisor is multiplied by this last part of the quotient, and the product subtracted from the last dividend; and so on, as long as any thing remains, or at least until it be evident that something will always remain.

EXAMPLE.

Divide $x^3 + {}^2xz + z^2$ by $x + z$.

$$\begin{array}{l} x+z\,)\,x^2+2\,xz+z^2\,(x+z \\ \quad x^2+\;\;xz \\ \hline \qquad\quad xz+z^2 \\ \qquad\quad xz+z^2 \\ \hline\hline \end{array}$$

EXPLANATION.

Here we enquire how often $x$, the first term of the divisor, is contained in $x^2$, the first term of the dividend: and as $x^2$ is the second power of $x$, or the product of $x$ multiplied by $x$, it follows, that if we divide the product by the root, the quotient will be the same root: and multiplying by it the divisor, the product is $x^2 + xz$, which subtracted from the dividend will leave $xz$. To this, bringing down the remaining term $z^2$, we have a new dividend $xz + z^2$. Then inquiring how often we can have $x$ of the divisor in $xz$, we see it can be taken $z$ times; for $x$ being one of the factors in the product, it is clear that $z$ must be the other. This written in the quotient with the sign $+$, because the signs of the divisor and dividend are like or the same, we next multiply the whole divisor by $z$, producing $xz + z^2$ equal to the last dividend.

## EQUATIONS.

In algebraic calculations it is generally the object, by means of certain known quantities, to discover others that are unknown, but

which are stated to stand in given proportions or relations to those known quantities. This is done by discovering what portion of such known quantities is equal in value to the required quantities; and the statement of this value is termed an *equation.* In the equation $a + b - c = x$, if the values of $ab + c$ be known, their sum, which is $x$, must also be ascertained. An equation is said to be *resolved* when the known quantities are all placed on the one side of the sign of equality, and the unknown quantities on the other; and the value of the unknown quantities is called the *root* of the equation. When an equation expresses the mere value of a quantity it is a *simple* equation: when it contains the second power or the square of the unknown quantity, it is a *quadratic* equation; when it exhibits the third power or cube, it is a *cubic* equation; the fourth power constitutes a *biquadratic* equation; and so on with the higher powers. When the unknown quantity is connected with a known quantity and their conjunct value is also known, the unknown quantity may be transposed to the one side of the equation, and the known quantities to the other, as in this example, where the value of $x$ is required, at the same time, that if 8 be taken from $x$, the remainder will be 20; $x - 8 = 20$.

EXAMPLES.

No. 1

$$x - 8 = 20$$
$$x = 20 + 8$$
$$x = 28$$

EXPLANATION.

Here we see that if 8 be taken from the value of $x$, the remainder will be 20; consequently, 20 and 8 must be equal to $x$; the 8 is therefore transposed to the opposite side of the equation with the sign $-$ changed to $+$.

No. 2.

Let $8x + 4$ be equal to $12x - 24$; required the value of $x$.

$$8x + 4 = 12x - 24$$
$$8x = 12x - 24 - 4$$
$$8x = 12x - 28$$
$$8x - 12x = 4x = 28$$
$$x = 7$$

EXPLANATION.

Here, as $8x$ is four less than $12x - 24$, $8x$ alone must be equal to $12x - 24 - 4$, or to $12x - 28$; this last sum therefore, 28, must be the difference between $8x$ and $12x$, that is, equal to $4x$; consequently, $x$ must be the fourth part of 28 or 7; and that this is the case, may be easily shown in this way. The question states that $8x + 4$ are equal to $12x - 24$: 8 times 7 are 56, and adding 4, we have 60: again, 12 times 7 are 84, from which subtracting 24, we have 60 as before.

APPLICATION.

Two friends, A and B, each riding his own horse, set out on the same day and at the same hour, from London and Edinburgh, for the purpose of meeting upon the road. A proceeded from London at the rate of 24 miles every day, and B travelled from Edinburgh at the rate of 20 miles every day. It is now desired to say at what time and at what point of the road the friends will meet, the distance between the towns being 396 miles? Let $z$ represent the number of days travelled by each before meeting: then A's journey will be represented by $24z$, and B's by $20z$: and as the sum of the two journeys must be equal to the whole distance between the towns, we proceed in the following way.

EXAMPLE.

$$\begin{aligned} & & & \textit{miles} \\ 24z &+ 20z &= 396 \\ & 44z &= 396 \end{aligned}$$

$$z = \frac{396}{44}$$

$$z = 9$$

EXPLANATION.

Thus we find the number of days each travelled to be 9, which may be proved by computing the several distances. 9 times 24 are 216 miles for A's journey. 9 times 20 are 180 miles for B's journey; and both together make 396 miles; so

that the friends would meet at a spot 216 miles north from London, and 180 miles south from Edinburgh, between Boroughbridge and Wetherby, in Yorkshire.

Those who wish further information on this subject, may consult Professor Sanderson's "Elements of Algebra," which is perhaps the completest elementary treatise in the English language. The smaller introductions are those of Fenning, Bonnycastle, Butler, and Joyce.

## Section V.—Logarithms.

Logarithms consist of a series of numbers in arithmetical or regular progression, adapted to another series in geometrical progression, or every figure doubled, as that 0 in the former always corresponds to 1 in the latter, and the succeeding terms of the former to the succeeding terms of the latter, each to each. The word 'logarithm' is derived from the Greek, λογος, *ratio*, and αριθμος, *number*; and implies either the ratio of numbers, or number of ratios; both interpretations being descriptive of the number of logarithms. The use of logarithms is to lessen the labour and time which long calculations performed by common numbers necessarily require; addition and subtraction by logarithms performing multiplication and division by numbers, &c. But the advantages attending the use of logarithms would be very limited indeed, if these useful numbers were exclusively confined to a geometrical progression; the common numbers not being in geometrical, but in arithmetical progression: this defect has, however, been happily supplied by an admirable contrivance, whereby logarithms are extended to the entire algorithm of numbers; every number, whether integral or fractional, having its proper logarithm. The fundamental property of logarithms is this;—if an arithmetical progression be applied to a geometrical one, in the manner above stated, the terms of the former will be indiced to those of the latter; now, if any two of these indices be added together, the sum will be the index of the product of the two numbers corresponding to those indices: if one index be subtracted from another, the remainder will be the index of the quotient which arises by dividing the number corresponding with the former, by that corresponding with the latter: if an index be multiplied by any number, the product

will be the index of the term which is the power denoted by that number; and if an index be divided by any number, the quotient will be the index of the root denoted by that number.

Logarithms were invented by John, Lord Napier, of Marchiston, near Edinburgh, in Scotland, who in 1614 gave to the world tables of these artificial numbers. No sooner was this admirably useful invention made known, than ingenious men, in various parts of Europe, set themselves with earnestness to understand and improve so valuable a discovery. It was, however, to the celebrated Henry Briggs, first of Gresham College, in London, afterwards professor of Geometry at Oxford, that the world was chiefly indebted for various improvements in logarithms. He travelled more than once down to Edinburgh to visit and confer with Lord Napier; and to the interchange of conceptions between those two geometricians of the first order, the world owes the perfect simplicity and utility of modern logarithms.

The first fruit of Mr. Briggs' labours in this way, was his "Logarithmorum Chilias Prima," which appeared in 1617, after Napier's death, containing the first thousand logarithms to eight places of figures, besides the index. Mr. Edmund Gunter adapted Mr. Briggs' logarithms, first of any, to the sines and tangents: he computed them for every minute, to seven places of figures, besides the index: this work first appeared in 1620, under the title of "A Canon of Triangles," and was reprinted in 1623, with the addition of the "Chilias Prima" of Briggs. The same year, Gunter applied the logarithms of numbers, sines, tangents, &c. to a straight-ruler, whereby computations may be performed by a pair of compasses only: this instrument is still known by the name of 'Gunter's Scale.' Other methods of projecting these numbers on circular, sliding, and spiral instruments, were afterwards invented by Wingate, Oughtred, Milburne, and Partridge. In 1624, Mr. Briggs published his "Arithmetica Logarithmica," containing the logarithms of numbers from 1 to 20,000, and from 90,000 to 100,000, with ample directions for their use, and an earnest invitation or request, addressed to mathematicians, to induce them to assist in the completion of the work, by computing the intermediate numbers. This task was undertaken and effected by Adrian Vlacq, of Gouda, in Holland; who, besides supplying the intermediate chiliads, added tables of artificial sines, tangents, and secants, for every minute of the quadrant. Since this time many improvements have been introduced. Dr. Hutton's "Mathematical Tables," published in 1785, contain the logarithms of numbers from 1 to 100,000, to seven decimals; logarithms to 20 places; logarithms to 61 places, &c.

## NATURE AND USE OF LOGARITHMS.

If a series of numbers be taken, increasing in any given proportion, so that the succeeding number shall be double the number before it, (*i. e.* in geometrical progression,) as 1, 2, 4, 8, 16, 32, 64, &c. and opposite to them place another set of numbers increasing by *arithmetical* progression, so that each succeeding number shall be 1 more than the number immediately before it, as 1, 2, 3, 4, 5, 6, 7, 8, 9, &c.; this curious effect and property will be found, that, by simply adding together the latter numbers, and observing that number of the first set, opposite to which this sum stands, we at once discover the product which would have been obtained by the multiplication of the two quantities in the set of geometrical progressionals, to which the arithmetical progressionals correspond. This will be more intelligible from a consideration of the following table :—

Table 1.

| 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

The upper row of numbers contains a set increasing regularly in such a geometrical proportion, that each succeeding number is double its predecessor: thus, 2 are double 1, 8 are double 4, 512 are double 256. In the lower row are a set of numbers increasing arithmetically by the addition of one; and these lower numbers are indexes of the number of reduplications, by which the upper set have been respectively increased.

Table 2.

| 1 | 10 | 100 | 1000 | 10,000 | 100,000 | 1,000,000 |
|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |

In the above table, the numbers in the upper row proceed in a tenfold geometrical proportion, each succeeding number being ten times its immediate predecessor; and the lower row of numbers increasing in an arithmetical proportion by one, point out how often the upper numbers opposite to each have undergone this

tenfold multiplication. The zero or nought is placed opposite to the original number 1 : but 2 indicates the number above it to be produced by 2 multiplications by 10: for 10 times 1 are 10, and 10 times 10 are 100. The index 4 shows that 10,000 is produced by 4 multiplications by 10; and 6 marks the 6 multiplications by 10, by which 1 is increased to 1,000,000. In both the tables here given as specimens, (for the rate of increase may be varied at pleasure,) the numbers in the lower row, increasing by the addition of 1, are the *logarithmic* numbers, corresponding to the *natural* numbers, increasing by a much more rapid augmentation in the upper row.

As an example of the nature and use of these logarithmic numbers, let us suppose it were required to find the product of 4 multiplied by 8. Table 1. Under 4 in the upper row or the natural numbers, we have 2 for its logarithm, and under the natural number 8 we have 3 for its logarithm. Then *adding* these two logarithms 2 and 3 together, we have 5 for the logarithm of the product; and over 5 we find 32 the natural product from *multiplying* 4 by 8.

In the same way in Table 2, when the natural numbers augment in a tenfold proportion, if we wanted to know the product of 10 by 1000, we would simply add together the indexes under 10 and 1000, which are 1 and 3, and above 4 their sum, we would find 10,000, the product required. If we wanted to discover the value of 10 multiplied by 100, and their product by 1000, we have only to add together the logarithms in the lower row corresponding to those natural numbers; viz. 1, 2, and 3, amounting to 6, over which logarithm we find 1,000,000, the ultimate product required.

To divide any given number by another, all we have to do is, from the logarithm of the greater number to subtract that of the less, when the remainder will be the logarithm of the quotient.

Thus, (Table 1,) let it be required to divide 512 by 8. From 9, the logarithm standing under the dividend 512, subtract 3 the logarithm under the divisor 8 and 6, the remainder is the logarithm of 64, the quotient of 512, divided by 8.

To divide 1,000,000 by 10,000 in Table 2, from 6, the logarithm of the dividend, we take away 4, the logarithm of the divisor when the remainder 2 is the logarithm standing under 100, the desired quotient.

To square any number, as 8, we have only to double the logarithm in Table 1, which is 3 making 6, above which we have 64, which is the square of 8: and the cube of 8 will be found by taking three times its logarithm 3 or 9, which stands under 512, the cube of 8.

To extract the square root of any given sum, as 64, we have only to take one-half of its logarithm 6 or 3, which is the logarithm of 8, the square root of 64 that was wanted: and the cube root of any quantity, as 512, will be found by merely taking the third part of its logarithm 9, which is 3, the logarithm of 8, the cube root of 512 that was required.

From the specimens here exhibited, the reader will be enabled to form a notion of the nature and uses of logarithms. According to the mode now adopted in constructing logarithmetic tables, by which the natural numbers increase in a tenfold proportion, the logarithm of 1 or unity being 0, that of 10 is 1, that of 100 is 2, that of 1000 is 3, that of 10,000 is 4, &c.: or in other words, the integral part of the logarithm is always one less than the number of figures in the natural number. This integral part is called the *characteristic* or *index* of the logarithm, because it points out and determines the number of places of figures in the corresponding natural number. Thus, the index 0 belongs to all numbers under 10: 1 belongs to all including and from 10 to and including 99; 2 to all including 999, &c.

Hence, also, it follows that numbers differing from one another in a tenfold proportion, will have the fractional part of their logarithms all the same, but the integral part or index varying according to the number of figures in the several numbers. Thus, in the figures of the year 1814:—

| *Natural numbers.* | | *Logarithms.* |
|---|---|---|
| 1814. | = | 3.258637 |
| 181.4 | = | 2.258637 |
| 18.14 | = | 1.258637 |
| 1.814 | = | 0.258637 |

That the reader may learn the manner of using tables of logarithms of natural numbers, a specimen is here introduced, comprising all numbers, from 1 to 100.

## LOGARITHMS OF NATURAL NUMBERS.

| Nat. N. | Logarithm. | Nat. N. | Logarithm. | Nat. N. | Logarithm. | Nat. N. | Logarithm. |
|---|---|---|---|---|---|---|---|
| 1 | 0.00000 | 26 | 1.41497 | 51 | 1.70757 | 76 | 1.88081 |
| 2 | 0.30103 | 27 | 1.43136 | 52 | 1.71603 | 77 | 1.88649 |
| 3 | 0.47712 | 28 | 1.44716 | 53 | 1.72428 | 78 | 1.89209 |
| 4 | 0.60206 | 29 | 1.46240 | 54 | 1.73240 | 79 | 1.90763 |
| 5 | 0 69897 | 30 | 1.47712 | 55 | 1.74036 | 80 | 1.90309 |
| 6 | 0.77815 | 31 | 1.49136 | 56 | 1.74819 | 81 | 1.90849 |
| 7 | 0.84510 | 32 | 1.50515 | 57 | 1.75587 | 82 | 1.91381 |
| 8 | 0.90309 | 33 | 1.51851 | 58 | 1.76342 | 83 | 1.91908 |
| 9 | 0.95424 | 34 | 1.53148 | 59 | 1 77085 | 84 | 1.92428 |
| 10 | 1.00000 | 35 | 1.54407 | 60 | 1.77815 | 85 | 1.92942 |
| 11 | 1.04139 | 36 | 1.55630 | 61 | 1.78533 | 86 | 1.93450 |
| 12 | 1.07918 | 37 | 1.56820 | 62 | 1.79239 | 87 | 1.93952 |
| 13 | 1.11394 | 38 | 1.57978 | 63 | 1.79934 | 88 | 1.94448 |
| 14 | 1.14613 | 39 | 1.59106 | 64 | 1.80618 | 89 | 1.94939 |
| 15 | 1.17609 | 40 | 1.60206 | 65 | 1.81291 | 90 | 1.95424 |
| 16 | 1.20412 | 41 | 1.61278 | 66 | 1.81954 | 91 | 1.95904 |
| 17 | 1.23045 | 42 | 1.62325 | 67 | 1 82607 | 92 | 1.96379 |
| 18 | 1.25527 | 43 | 1.63347 | 68 | 1.83251 | 93 | 1.96848 |
| 19 | 1.27875 | 44 | 1.64345 | 69 | 1.83885 | 94 | 1.97314 |
| 20 | 1.30103 | 45 | 1.65321 | 70 | 1.84510 | 95 | 1.97772 |
| 21 | 1.32222 | 46 | 1.66276 | 71 | 1.85126 | 96 | 1.98227 |
| 22 | 1.34242 | 47 | 1.67210 | 72 | 1.85733 | 97 | 1.98677 |
| 23 | 1.36173 | 48 | 1.68124 | 73 | 1.86332 | 98 | 1.99123 |
| 24 | 1.38021 | 49 | 1.68920 | 74 | 1.86923 | 99 | 1.99565 |
| 25 | 1.39794 | 50 | 1.69897 | 75 | 1.87506 | 100 | 2.00000 |

The foregoing table is used in the following manner:—If the logarithm of any number within its limits be wanted, *e.g.* 64, look for that number in the narrow column of natural numbers (marked *Nat. N.*) at the top, and on the same line, in the broad column on the right hand (marked *Logarithm*) you find 1.80618: in the same way, the logarithm of 5 will be found 0.69897, and that of 100 is 2.00000.

Again, if the natural number corresponding to any given logarithm be required, search in the column of logarithms for the one given, and on the left hand in the column of numbers is what is wanted: thus, if the logarithm 1.80618 be wanted, by tracing the order of the figures it will be found; and on the left, the natural

number corresponding, which is 64. In the course of calculations, however, it frequently happens that we have occasion for natural numbers higher than the tables contain ; as for example, the table here given goes only to include 100, but we want the logarithm of 144. The fractional part of the logarithm 140, which is the nearest below 144, being the same with that of 14, take it from the table which is .14613 : in the same way, take the fractional part of the logarithm for 15, the same with that for 150, the nearest number above 144, which is .17609. The difference between these two fractions is .02996, corresponding to 10, the difference between 140 and 150: but in order to know how much 144 exceeds 140 in the fractional part, state the following proportion :—As 10, the excess of 150 above 140, to the difference of fractions .02996, so 4, the excess of 144, above the same 140 to a fourth number, which, by the Simple Rule of Three, will turn out .01198. This quantity, added to .14613, the fractional part of 140, will give .15811 as the fractional part of the logarithm of 144; and this number consisting of three figures, the index or characteristic must be 2; consequently, the logarithm of 144 must be 2.15811.

MULTIPLICATION is performed in logarithms as in the following examples, where it is required to multiply 12 by 8. Find in the tables the logarithms of these numbers: add them together, and in the column of logarithms look for the sum or the nearest to it, when the natural number opposite to it will be the required product.

EXAMPLES.

No. 1.

Logarithm of 12 is 1.07918
" 8 = 0.90309 } add

Product 96 = 1.98227

No. 2.

Again, 3 by 5, and the product by 6.

Multiply { Logarithm of 3 is 0.47712
" 5 = 0.69897
" 6 = 0.77815 } add

Product 90 = 1.95424

DIVISION is performed by subtracting the logarithm of the least quantity from that of the greatest, when the difference will be the logarithm of the quotient, as follows, where 96 must be divided by 12 :—

EXAMPLES.

No. 1.

Logarithm of 96 is 1.98227
„ 12 = 1.07918 subtract

Quotient 8 = 0.90309

No. 2.

Divide 90 by 6, and the quotient by 5.

Logarithm of 90 is 1.95424
„ 6 = 0.77815 subtract

Quotient . . . 15 = 1.17609
Logarithm of 5 = 0.69897 subtract

Quotient . . 3 = 0.47712

In the foregoing examples, the utility of logarithms cannot be so apparent as it deserves, because only such small numbers as come within the specimen of the tables are chosen : but when considerable numbers are employed, as in the following example, the advantages of logarithms will be evident.

Suppose it were required to multiply 98730 by 5865 ; by logarithms, the operation is performed very speedily, as follows :—

EXAMPLE.

Logarithm of 98730 = 4.99445 } add
„ 5865 = 3.76827 }

Product 579051450 = 8.76272

This multiplication done in common numbers is not only tedious, but subject to mistakes, which can scarcely occur in the above short operation.

# CHAPTER V.

## COMMERCE, TRADE, &c.

THE term 'commerce' is usually applied to that exchange of commodities which takes place between different nations, while the dealings between inhabitants of the same countries are generally denominated 'trade.'

### SECTION I.—HISTORY AND GENERAL PRINCIPLES.

THE advantages of commerce began to engage the attention of mankind at a very early period. About 1300 years after the Flood, the commerce of the Phœnicians had attained to a considerable extent: they possessed manufactures, entered into commercial partnerships, made long voyages, had resident agents to foreign countries, and had adopted the practice of lending money on bottomry. The Greeks and Romans, particularly the latter, carried on an extensive trade, considering the imperfect state of navigation. The reign of Augustus was particularly favourable to commerce, as the general peace which then prevailed enabled the merchants to pursue their concerns unmolested. The establishment of Christianity in the northern parts of Germany, in consequence of the conquests of Charlemagne, produced a connexion between those parts and the southern parts of Europe, which naturally led to an interchange of produce, and gradually introduced foreign commerce in the north. The Germans had, however, previously to this period, cultivated a commercial intercourse with the neighbouring states, which was afterwards much increased by the discovery of valuable mines in Saxony, and the establishment of some manufactures in Flanders.

In the ninth century, the Venetians carried on a very beneficial commerce with the Levant; whence they bought spices, silks, drugs, and fruits, from the East, in great abundance, and supplied

the greater part of Europe with these commodities. The crusades contributed materially to the revival of commerce during the twelfth and thirteenth centuries, by introducing an acquaintance with the luxuries of the East, which multiplied the objects of foreign trade. About this time, the commercial towns bordering on the coasts of the Baltic, finding their trade much interrupted by pirates, entered into agreement for mutual support and assistance. This union, which became very celebrated, under the title of the Hanseatic League, at first consisted of only twelve towns, but finally of upwards of seventy, including all the principal commercial towns of Europe, and embracing nearly all the foreign trade then carried on.

The invention of the mariner's compass, which enabled trading vessels to make much longer voyages, and led to the discovery of a passage to the East Indies, by the Cape of Good Hope, with the settlements made on the coast of Africa, in Arabia, and in India, affected very materially the commerce of the Mediterranean, and of the Hanse Towns, and threw the principal part of the foreign trade of Europe into the hands of the Portuguese. The Venetians, however, still carried on a great trade with India by way of Egypt, for spices and other eastern commodities: the Indian goods were first landed at Aden in Arabia, carried across that country on canals to the Red Sea, thence overland to the Nile, down that river to Cairo and Alexandria, and thence transported to Venice, whence the Venetians circulated them through every part of Europe.

The Dutch soon began to rival the Portuguese in trade; and in a little time not only dispossessed them of nearly the whole, but from their industry and skill in navigation, and their attention to the fisheries, acquired an extent of foreign trade considerably greater than had been previously possessed by any European power. The discovery of America opened a new and extensive field for commercial adventure, while the establishment of manufactures produced new articles of trade. The persecutions of the Spaniards drove great numbers of industrious workmen from the Netherlands into England and other countries, who introduced several manufactures into this country, and greatly improved others which were already established. While the different branches of its manufactures were thus improving, its colonial possessions in the East and West Indies were greatly increased, and Great Britain was enabled to rival the Dutch, not only in manufactured goods, but also in all the principal articles of colonial produce.

The vast extent to which the commerce of this country has expanded, appears astonishing when it is considered how great a

proportion of the materials of its manufactures are of foreign produce, and the many duties with which the increase of the national expenditure has loaded most articles of foreign trade. The natural advantages arising from the situation of this country, its formidable navy, and extensive colonial possessions, particularly in the East Indies, have favoured and protected its commercial intercourse; while the accumulated capital of individuals has gradually enabled them to give very considerable credit to their customers, which of late years, has been of much importance in increasing the commerce of Great Britain to its present extent.

Besides trading with all civilized nations, the British have established settlements or colonies in Asia, Africa, America and Australasia; by which means they enjoy the profits of cultivation in addition to those of local monopoly. Among these the following are the principal:—In Asia, Bengal, the countries on the Ganges, the coasts of Coromandel and Malabar, and the islands of Ceylon and Sumatra. From these and neighbouring countries, they bring to Europe spices, silk, rice, tea, muslin, coffee, drugs, perfumes, and precious stones. In Africa, the colonies of Britain are the Cape of Good Hope, Goree, Sierra Leone, and parts of the coast of Guinea. From these, they bring to Europe, gold dust, ivory, gums, and drugs. In America, the British provinces of Upper and Lower Canada, Nova Scotia, &c. produce furs, corn, and fish. In the West Indies, Great Britain occupies Jamaica, Barbadoes, and several other islands, besides Demerara, &c., on the main; all of which supply sugar, rum, cotton, coffee, spices, drugs, mahogany, dried and preserved fruit, &c. These luxuries become desirable mediums of exchange for the produce and manufactures of other countries. They are sent to Russia, in exchange for hemp, tar, and tallow; to Sweden, for copper; to Norway, for timber; to Germany, for wool, rags, and smalts for paper; to France, for wine and brandy; to Portugal, for wine; to Spain, for gold, silver, and fruit; to Italy, for silk, rags, oil, and fruit; and to Turkey, for silk, drugs, oil, and coffee. The colonies in the New Southern Continent and Islands, are at present too much in their infancy to derive any important advantages from them.

The trade of Great Britain with foreign nations, is carried on partly by companies, and partly by private merchants. The most considerable companies are the following, though most of them are now, in part, superseded by the permission since granted to private merchants:—the East India Company, which enjoys a partial monopoly of the trade to Asia; and the Hudson's Bay Company, which monopolizes the trade in furs from these countries.

There were also the Turkey, Russia, African, and South Sea Companies; some of these are however extinct. (See the next Section.) There is a Board of Trade and Colonies, with commissioners, clerks, &c. &c., but none of them are traders. There are British consuls at 126 foreign ports, or commercial cities, and about the same number from all foreign governments in the ports and towns of the United Kingdom.

The foreign ships entered inwards were, in 1816, 3974; in 1826, 6166; in 1829, 5406; and 1830, 5218. London owns 2663 ships; Newcastle, 987; Liverpool, 805; Sunderland, 624; Whitehaven, 496; Hull, 579; Bristol, 316; Yarmouth, 579; Plymouth, 302; Dartmouth, 349; Beaumaris, 389; Cardigan, 281; Gloucester, 247; Rochester, 255; Faversham, 217; Colchester, 235; Greenock, 371; Glasgow, 235; Aberdeen, 350; Dundee, 299; Leith, 263; Grangemouth, 204; Belfast, 247; Dublin, 289; Cork, 256; Jersey, 200; and Man, 217; with other ports; in all, 19,110, and 2,199,959 tons. There were 241 steam vessels in 1829 in England, of 20,611 tons; 75 in Scotland, of 5953 tons; and 26 in Ireland, of 4791 tons; total, 342 vessels; since increased to 400. Of 13,475 vessels which passed the Sound in 1829, 4790 were British, and only 181 French, and 181 Americans.

The exports at the British custom-houses are estimated at a standard rate of value, for the purpose of comparing, in equal values, one year with another. This official value was fixed in the reign of William III. On the other hand, the merchants declare an invoice price, called the declared value, and the difference between the two indicates the comparative profits of trade. In 1828, the declared value of exports were £36,814,176; and in 1827, £37,182,857.

The inland or domestic trade of Great Britain and Ireland, is carried on by means of many thousand waggons and stage-coaches; by canals, rail-roads, and rivers, which intersect every part of the two islands; and by hundreds of coasting vessels, which carry the produce and manufactures from one place to another. The coasting trade of the United Kingdom, including colliers, employs about 3000 vessels, of which about 1200 are colliers. The number of coasting vessels, which arrive in the port of London annually, is about 18,000, or three times the number which it was at the beginning of the last century. By Mr. Williams's evidence in 1829, England has of canals 2,400 miles; navigable rivers, 2,000; railroads, 400; since greatly increased. Ireland has of canals 280 miles; navigable rivers, 150; river Shannon, 230. About 3000 parcels arrive daily in London by coaches and waggons.

The chief manufacturing towns in England are, for cutlery and metallic wares, Birmingham, Wolverhampton, and Sheffield; for calicoes and muslins, Manchester, Stockport, Bolton, Glasgow, and Paisley; for woollen cloths, Leeds and Norwich; for hosiery, Nottingham, and Leicester; for linens, Belfast and Londonderry; for carpets, Kidderminster and Wilton; and for china, porcelain, and glass, Newcastle and Worcester.

Of cotton manufactures, in 1829, there were exported 363 millions of yards, value $12\frac{1}{2}$ millions; of cotton, twist, and yarn, 50 millions of lbs., value $3\frac{1}{2}$ millions; of linens, $60\frac{1}{4}$ millions of yards, value $2\frac{1}{3}$ millions; of woollens, 1,820,631 pieces, value £4,397,291; and 6,816,407 yards, value £527,476, with other articles, forming a declared value of £36,812,756. Cotton is the chief branch of our manufacturing system, (double that of all the rest of the world,) and the most extraordinary commercial operation ever carried on by any nation. The cotton manufacturing district of Lancashire includes the parish of Manchester, equal to sixty square miles; Oldham, about 20 square miles; Rochdale, Middleton, Stockport, Bury, Oldham, Blackburn, &c., and the whole contains about 72,000 families, engaged chiefly in this fabric, which at $6\frac{1}{2}$ makes 468,000 souls by the returns of 1821, and now probably 80,000 families, and 520,000 souls. Of these the Manchester district contained, in 1821, about 32,000 families; Ashton, 4500; Oldham, 7000; Rochdale, 7500; Middleton, 2000; Bury, 6000; Bolton and Wigan, 4000; and other places, 9000 more. In Derbyshire, Cheshire, and other districts, at least as many more, or nearly two millions, depend on this fabric.

Such are the principal facts in relation to the history of commerce, in which it will be seen at one view how conspicuous a share is taken by our own country. We now proceed to notice some of the leading principles on which these important transactions are carried on, and the connexion which naturally subsists between our home and our foreign trade. Let not this subject be deemed dry or uninteresting to the youth of Great Britain, seeing that it is upon these principles that our unrivalled prosperity, as compared with that of other nations, entirely depends. While the exchange of different commodities is carried on in any country by the producers themselves, they must unavoidably lose a great deal of time, and experience many inconveniences. Were there no merchants, a farmer wishing to sell his crop would be obliged, in the first place, to seek for customers, and to dispose of his corn as nearly as possible in such quantities as might suit the demands of the various individuals inclined to buy it; and after getting its price, he would next be obliged to send to ten or twenty

different, and, perhaps, remote places, for the commodities he wanted to get in its stead. So that, besides being exposed to a world of trouble and inconvenience, his attention would be continually diverted from the labours of his farm. Under such a a state of things, the work of production, in every different employment, would be meeting with perpetual interruptions, and many branches of industry, that are successfully carried on in a commercial country, would not be undertaken.

The establishment of a distinct mercantile class effectually obviates these inconveniences. When a set of dealers erect warehouses and shops for the purchase and sale of all descriptions of commodities, every producer, relieved from the necessity of seeking customers, and knowing beforehand where he may at all times be supplied with such products as he requires, devotes his whole time and energies to his proper business. The intervention of merchants gives a continuous and uninterrupted motion to the plough and the loom. Were the class of traders annihilated, all the springs of industry would be paralyzed. The numberless difficulties that would then occur in effecting exchange would lead each particular family to endeavour to produce all the articles they had occasion for: society would thus be thrown back into primeval barbarism and ignorance; the divisions of labour would be relinquished; and the desire to rise in the world, and improve our condition, would decline, according as it became more difficult to gratify it. It is by the assistance each individual renders to and receives from his neighbours, by every one applying himself in preference to some peculiar task, and combining, though probably without intending it, his efforts with those of others, that civilized man becomes equal to the most gigantic efforts; and appears endowed with almost omnipotent power.

The labours of the mercantile classes enable the inhabitants of each district to apply themselves principally to those employments that are naturally best suited to them. This superadding of the division of labour among different provinces to its division among different individuals, renders the productive powers of industry immeasurably greater; and augments the mass of necessaries, conveniences, and enjoyments, in a degree that could not previously have been conceived possible, and which cannot be exceeded except by the introduction of foreign commerce.

"With the benefits of commerce," says an eloquent and philosophical writer, "or a ready exchange of commodities, every individual is enabled to avail himself, to the utmost, of the peculiar advantage of his place; to work on a peculiar material with which nature has furnished him; to humour his genius or dis-

position, and betake himself to the task in which he is peculiarly qualified to succeed. The inhabitant of the mountain may betake himself to the culture of his woods and the manufacture of his timber; the owner of pasture-lands may betake himself to the care of his herds; the owner of the clay-pit to the manufacture of his pottery; and the husbandman to the culture of his fields, or the rearing of his cattle; and any one commodity, however it may form but a small part in the accommodations of human life, may, under the facility of commerce, find a market in which it may be exchanged for what will procure any other, or the whole; so that the owner of the clay-pit, or the industrious potter, without producing any one article immediately fit to supply his own necessities, may obtain possession of all that he wants. And commerce, in which it appears that commodities are merely exchanged, and nothing produced, is, nevertheless, in its effects, very productive, because it ministers a facility and an encouragement to every artist in multiplying the productions of his own art; thus adding greatly to the mass of wealth in the world, in being the occasion that much is produced."—*Ferguson's Principles of Modern Science.*

What home trade is to the different provinces of the same country, foreign trade is to all the countries of the world. Particular countries produce only particular commodities, and, were it not for foreign commerce, would be entirely destitute of all but such as are indigenous to their own soil. It is difficult for those who have not reflected on the subject, to imagine what a vast deduction would be made, not only from the comforts, but from the necessaries of every commercial people, were its intercourse with strangers put an end to. It is not, perhaps, too much to say that in Great Britain we owe to our intercourse with other nations a full half, or more, of all that we enjoy. We are not only indebted to it for the cotton and silk manufactures, and for supplies of wine, tea, coffee, sugar, the precious metals, &c.; but we are also indebted to it for most of the fruits and vegetables that we now cultivate. At the same time, too, that foreign commerce supplies us with an immense variety of most important articles, of which we must otherwise have been wholly ignorant, it enables us to employ our industry in the mode in which it is sure to be most productive, and reduces the price of almost every article. We do not misemploy our labour in raising sugar from the beet-root, in cultivating tobacco, or in forcing vines; but we employ ourselves in those departments of manufacturing industry in which our command of coal, of capital, and of improved machinery, give us an advantage; and obtain the articles produced more cheaply by foreigners, in exchange for the surplus produce of

those branches in which we have a superiority over them. A commercial nation like England avails herself of all the peculiar facilities of production given by Providence to different countries. To produce claret here is perhaps impossible; and at all events could not be accomplished, unless at more than a hundred times the expense required for its production in France. We do not, however, deny ourselves the gratification desirable from its use; and to obtain it, we have only to send to France, or to some country indebted to France, some article in the production of which we have an advantage, and we get claret in exchange at the price which it takes to raise it under the most favourable circumstances. One country has peculiar capacities for raising corn, but is at the same time destitute of wine, silk, and tea; another again, has peculiar facilities for raising the latter, but is destitute of the former; and it is impossible to point out a single country which is abundantly supplied with any considerable variety of commodities of domestic growth. Providence, by giving to each particular nation something which the others want, has evidently intended that they should be mutually dependent upon one another.

The commerce of one country with another is, in fact, to use the words of an able and profound writer, "merely an extension of that division of labour by which so many benefits are conferred upon the human race. As the same country is rendered the richer by the trade of one province with another; as its labour becomes thus infinitely more divided and more productive than it could otherwise have been; and as the mutual supply to each other of all the accommodations which one province has, and another wants, multiplies the accommodations of the whole, and the country becomes thus in a wonderful degree more opulent and happy; the same beautiful train of consequences is observable in the world at large,—that great empire of which the different kingdoms and tribes of men may be regarded as the provinces. In this magnificent empire, too, one province is favourable to the production of one species of accommodation, and another province to another: by their mutual intercourse they are enabled to sort and distribute their labour as most peculiarly suits the genius of each particular spot. The labour of the human race thus becomes much more productive, and every species of accommodation is afforded in much greater abundance. The same number of labourers, whose efforts might have been expended in producing a very insignificant quantity of home-made luxuries, may thus, in Great Britain, produce a quantity of articles for exportation, accommodated to the wants of other places, and peculiarly suited to the genius of

Britain to furnish, which will purchase for her an accumulation of the luxuries of every quarter of the globe. There is not a greater proportion of her population employed in administering to her luxuries, in consequence of her commerce; there is probably a good deal less; but their labour is infinitely more productive: the portion of commodities which the people of Great Britain acquire by means of the same labour, is vastly greater."

The statements already made, by explaining the nature and principles of commercial transactions, are sufficient to evince the inexpediency of subjecting them to any species of restraint. It is obvious, indeed, that restrictions are founded on false principles. When individuals are left to pursue their own interest in their own way, they naturally resort to those branches of industry which they reckon most advantageous for themselves; and, we have just seen, these are the very branches in which it is most for the public interest that they should be employed. Unless, therefore, it could be shown that a government can judge better as to what sort of transactions are profitable or otherwise than private individuals, its regulations cannot be of the smallest use, and may be exceedingly injurious. But any such pretension on the part of government would be universally scouted. It is undeniably certain that a regard to our own interest is, if not an unerring guide to direct us in such matters, at least incomparably better than any other. If the trade with a particular country, or in a particular commodity, be a losing one, or merely a less profitable one than others, it is quite as necessary to pass an act to prevent it from being carried on, as it would be to interfere to prevent individuals from selling their labour or their commodities below the market price. It appears, therefore, that all regulations affecting the freedom of commerce, or of any branch of industry, are either useless or pernicious. They are useless, when they are intended to protect the interest of individuals by preventing them from engaging in disadvantageous business; and pernicious, when they prevent them from engaging in those that are advantageous. The self-interest of the parties concerned is the only safe principle to go by in such matters. When the acts of the legislature are in unison with it, there is nothing to object to in them, save only that they might as well not exist; but whenever they are inconsistent with it, that is, whenever they tend to divert capital and industry into channels, into which individuals, if left to their own discretion, would not have carried them, they are decidedly injurious.

The principles of commercial freedom, and the injurious influence of restrictive regulations, were set down in a very striking

point of view by Dr. Smith in his great work; and they have been since repeatedly explained and elucidated. Perhaps, however, the true doctrines upon this subject have nowhere been better stated than in the petition presented by the merchants of London to the House of Commons, on the 8th of May, 1820. This document is one of the most gratifying proofs of liberal and enlarged views. It was subscribed by all the principal merchants of the metropolis, who have not scrupled to express their conviction, that the repeal of every protective regulation would be for the public advantage. Such an address, confirming, as it did, the conclusions of science, by the approval of the best informed and most extensive merchants of the world, had a powerful influence on the legislature. During the last ten years several most important reforms have been made in our commercial system; so that, besides being the first to promulgate the true theory of commerce, we are now entitled to the praise of being the first to carry it into effect. No doubt our trade is still fettered by many vexatious restraints; but these will gradually disappear, according as experience serves to disclose the benefits resulting from the changes already made, and the pernicious operation of the restrictions that are still allowed to continue. The petition now referred to will admirably illustrate the observations already made. It is as follows:—

"*To the Honourable the Commons, &c., the Petition of the Merchants of the City of London,*

"Sheweth,

"That foreign commerce is eminently conducive to the wealth and prosperity of a country, by enabling it to import the commodities for the production of which the soil, climate, capital, and industry of other countries are best calculated, and to export, in payment, those articles for which its own situation is better adapted.

"That freedom from restraint is calculated to give the utmost extension to foreign trade, and the best direction to the capital and industry of the country.

"That the maxim of buying in the cheapest market, and selling in the dearest, which regulates every merchant in his individual dealings, is strictly applicable, as the best rule for the trade of the whole nation.

"That a policy founded on these principles would render the commerce of the world an interchange of mutual advantages, and diffuse an increase of wealth and enjoyments among the inhabitants of each state.

"That, unfortunately, a policy the very reverse of this has been, and is, more or less, adopted and acted upon by the government of this and every other country; each trying to exclude the productions of other countries, with the specious and well-meant design of encouraging its own productions: thus inflicting on the bulk of its subjects, who are consumers, the necessity of submitting to privations in the quantity or quality of commodities; and thus rendering what ought to be the source of mutual benefit and of harmony among states, a constantly recurring occasion of jealousy and hostility.

"That the prevailing prejudices in favour of the protective and restrictive system may be traced to the erroneous supposition, that every importation of foreign commodities occasions a diminution or discouragement of our own productions to the same extent: whereas it may be clearly shown, that although the particular description of production which could not stand against unrestrained foreign competition would be discouraged, yet, as no importation could be continued for any length of time without a corresponding exportation, direct or indirect, there would be an encouragement, for the purpose of that exportation, of some other production to which our situation might be better suited; thus affording at least an equal, and probably a greater, and certainly a more beneficial, employment to our capital and labour.

"That of the numerous protective and prohibitory duties of our commercial code, it may be proved that, while all operate as a very heavy tax on the community at large, very few are of any ultimate benefit to the classes in whose favour they were originally instituted, and none to the extent of the loss occasioned by them to other classes.

"That among the other evils of the restrictive or protective system, not the least is, that the artificial protection of one branch of industry or source of production against foreign competition, is set up as a ground of claim by other branches for similar protection; so that if the reasoning upon which these restrictive or prohibitory regulations are founded, were followed out consistently, it would not stop short of excluding us from all foreign commerce whatsoever. And the same train of argument, which, with corresponding prohibitions and protective duties, should exclude us from foreign trade, might be brought forward to justify the re-enactment of restrictions upon the interchange of productions (unconnected with public revenue) among the kingdoms composing the Union, or among the countries of the same kingdom.

"That an investigation of the effects of the restrictive system at this time is peculiarly called for, as it may, in the opinion of

your petitioners, lead to a strong presumption, that the distress which now so generally prevails, is considerably aggravated by that system; and that some relief may be obtained by the earliest practicable removal of such of the restraints as may be shown to be most injurious to the capital and industry of the community, and to be attended with no compensating benefit to the public revenue.

"That a declaration against the anti-commercial principles of our restrictive system is of the more importance at the present juncture: inasmuch as, in several instances of recent occurrence, the merchants and manufacturers of foreign countries have assailed their respective governments with applications for further protective or prohibitory duties and regulations, urging the example and authority of this country, against which they are almost exclusively directed, as a sanction for the policy of such measures. And certainly, if the reasoning upon which our restrictions have been defended is worth anything, it will apply in behalf of the regulations of foreign states against us. They insist upon our superiority in capital and machinery, as we do upon their comparative exemption from taxation, and with equal foundation.

"That nothing could tend more to counteract the commercial hostility of foreign states, than the adoption of a more enlightened and more conciliatory policy on the part of this country.

"That although, as a matter of mere diplomacy, it may sometimes answer to hold the removal of particular prohibitions, or high duties, as depending upon corresponding concessions by other states in our favour, it does not follow that we should maintain our restrictions in cases where the desired concessions on their part cannot be obtained. Our restrictions would not be the less prejudicial to our own capital and industry, because other governments persisted in preserving impolitic regulations.

"That, upon the whole, the most liberal would prove to be the most politic course on such occasions.

"That, independent of the direct benefit to be derived by this country, on every occasion of such concession or relaxation, a great incidental object would be gained, by the recognition of a sound principle or standard, to which all subsequent arrangements might be referred; and by the salutary influence which a promulgation of such just views, by the legislature and by the nation at large, could not fail to have on the policy of other states.

"That in thus declaring, as your petitioners do, their conviction of the impolicy and injustice of the restrictive system, and in desiring every practicable relaxation of it, they have in view only such parts of it as are not connected, or are only subordinately so,

with the public revenue. As long as the necessity for the present amount of revenue subsists, your petitioners cannot expect so important a branch of it as the customs to be given up, or to be materially diminished, unless some substitute less objectionable be suggested. But it is against every restrictive regulation of trade, not essential to the revenue, against all duties merely protective from foreign competition, and against the excess of such duties as are partly for the purpose of revenue, and partly for that of protection, that the prayer of the present petition is respectfully submitted to the wisdom of parliament.

"May it therefore," &c.

## Section II.—Commercial Companies.

In commerce or the arts, a company is a number of persons associated together for the purpose of carrying on some commercial or industrious undertaking. Companies have generally been divided into two great classes—exclusive or joint stock companies, and open or regulated companies.

### Exclusive or Joint Stock Companies.

By this is meant a company having a certain amount of capital, divided into a greater or smaller number of transferable shares, managed for the common advantage of the shareholders by a body of directors chosen by and responsible to them. After the stock of a company of this sort has been subscribed, no one can enter it without previously purchasing one or more shares belonging to some of the existing members. The partners do nothing individually; all their resolutions are taken in common, and are carried into effect by the directors and those whom they employ.

According to the common law of England, all the partners in a joint stock company are jointly and individually liable, to the whole extent of their fortunes, for the debts of the company. They may make arrangements amongst themselves, limiting their obligations with respect to each other; but unless established by an authority competent to set aside the general rule, they are all indefinitely responsible to the public. Parliament sometimes limits the responsibility of the shareholders in joint stock companies established by statute, to the amount of the shares they respectively hold. Charters of incorporation granted by the crown were also, until lately, supposed naturally to have this

effect; by the Act 6 Geo. IV. c. 96, the crown is empowered to grant charters of incorporation by which the members of corporate bodies may be made individually liable, to such extent, and subject to such regulations and restrictions, as may be deemed expedient. Hence charters are now frequently granted for the purpose merely of enabling companies to sue and be sued in courts of law, under the names of some of their office-bearers, without in any respect limiting the responsibility of the shareholders to the public. This limitation cannot be implied in a charter any more than in an act of parliament, and will be held not to exist unless it be distinctly set forth.

The trade of a joint stock company is usually managed by a court of directors. This court indeed is frequently subject, in many respects, to the control of a general court of proprietors. But the greater part of these proprietors seldom pretend to understand any thing of the business of the company, and give themselves no trouble about it, but receive contentedly such half-yearly or yearly dividend as the directors think proper to make to them. This total exemption from trouble and risk, beyond a limited sum, encouraged many people to become adventurers, in joint stock companies, who would upon no account hazard their fortunes in any private copartnery. This has in some respects been found injurious, by encouraging a taste for speculation. The principal joint stock companies for foreign trade at present subsisting in Great Britain are, the South Sea and the East India companies; to which may be added, though of very inferior magnitude, the Hudson's-Bay company.

*The South Sea Company.*—During the long war with France in the reign of queen Anne, the payment of the sailors of the royal navy being neglected, they received tickets instead of money, and were frequently obliged by their necessities to sell these tickets to avaricious men at a discount of 40 and sometimes 50 per cent.

By this and other means the debts of the nation unprovided for by parliament, and which amounted to £9,471,321, fell into the hands of these usurers; on which Mr. Harley, at that time chancellor of the exchequer, and afterwards earl of Oxford, proposed a scheme to allow the proprietors of these debts and deficiences 6 per cent. per annum, and to incorporate them for the purpose of carrying on a trade to the South Sea; and they were accordingly incorporated under the title of "the governor and company of Merchants of Great Britain trading to the South Seas, and other parts of America, and for encouraging the fishery." The company was established by act of parliament in the 9th of

queen Anne, and vested in the sole trade to and from all lands and kingdoms on the east side of America, from the river Oronooko to the southernmost part of Terra del Fuego, and from thence to the northernmost part of America on the west side.

In the year 1722, this company petitioned parliament to be allowed to divide their immense capital of more than £33,800,000, the whole of which had been lent to government, into two equal parts: the one half, or upwards of £16,900,000 to be put upon the same footing with other government annuities. In 1733 they again petitioned the parliament, that three-fourths of their trading stock might be turned into annuity stock, and only one-fourth remain as trading stock, or exposed to the hazards arising from the bad management of their directors. In 1748 an end was put to their trade in the Spanish West Indies, the remainder of their trading stock was turned into annuity stock, and the company ceased in every respect to be a trading company.

The annuity portion of the debt, amounting, on the 4th of January, 1830, to £10,144,584, is all that now remains of the capital of the once famous South Sea Company. The company having, as before stated, for a considerable time past, ceased to have any thing to do with trade, the functions of the directors are wholly restricted to the transfer of the company's stock, and the payment of the dividends on it; both of which operations are performed at the South Sea House, and not at the Bank. The dividends on the old South Sea annuities are payable on the 5th of April and 10th of October; the dividends on the rest of the company's stock are payable on the 5th of January and 5th of July.

*East India Company.*—The first, or as it is called, the old East India Company, was established by a charter from queen Elizabeth in 1600, which continued till the year 1698; a proposal was then made by a number of merchants to parliament for advancing the sum of £2,000,000 to government, on condition of erecting the subscribers into a new East India Company with exclusive privileges. The old company endeavoured to prevent the appearance of such a formidable rival, by offering government £700,000 nearly the amount of their capital at that time; but such were the exigencies of the state, that the larger sum, though at eight per cent. interest, was preferred to the smaller at one half the expense. Thus were two East India companies erected in the same kingdom, which could not but be very prejudicial to each other. In 1702, however, their differences were adjusted, and the two companies were, in some measure, united by an indenture tripartite, to which the queen was the third party; and, in 1708,

they were perfectly consolidated into one company by their present name of "the United Company of Merchants trading to the East Indies." The authority of parliament was soon after interposed to give effect to this agreement. The United Company engaged to advance £1,200,000 to government without interest, which, as a previous advance had been made of £2,000,000 at 8 per cent., made the total sum due to them by the public £3,200,000 bearing interest at 5 per cent.; and government agreed to ratify the terms of their agreement, and to extend the charter to the 25th of March, 1726, with three years' notice.

For some years after the re-establishment of the company, it continued to prosecute its efforts to consolidate and extend its commerce. But the unsettled state of the Mogul empire, coupled with the determination of the company to establish factories in every convenient situation, exposed their affairs to perpetual vicissitudes. Nevertheless their charter was subsequently renewed at various periods. By accounts from India in the year 1768 their revenue, clear of all deductions and military charges, was stated at £2,048,747. At the same time they were said to possess another revenue, arising partly from lands, but chiefly from the customs established at their different settlements, amounting to about £439,000. The profits of their trade, too, according to the evidence of their chairman before the house of commons, amounted to at least £400,000 per annum. Notwithstanding this apparent wealth, however, the affairs of the company from this time fell into disorder; insomuch that in 1773, their debts were augmented by several causes to the amount of more than £1,200,000. Thus they were obliged to apply to government for assistance. In 1783, after much discussion, it was agreed that the company should enjoy their exclusive privileges to the 1st of March, 1794, then to cease and determine, upon the former conditions of three years' previous notice, and the repayment of all sums due to them.

In the beginning of 1793 the subject of laying open the trade to India was again discussed, and though it was not thought proper to risk the loss and confusion which must unavoidably attend an attempt to take such an immense concern out of the hands in which it had so long continued, a stipulation was made in the agreement for the renewal of this charter, that such regulations should be adopted as to admit of a free exportation by private persons on their own account, of any goods of the growth, produce, or manufacture of Great Britain or Ireland; and of a free importation of such sorts of the raw materials of the East Indies as are used in the manufactures of Great Britain or

Ireland; that the company should be obliged to provide shipping for the carriage of the private trade, at as low freight as it could be furnished by private merchants; and that they should license a proper number of agents to reside at the company's settlements, under their protection, for the management of the private trade. On these conditions the company's term in the exclusive trade was enlarged for twenty years, or to the 1st of March 1814, with the former proviso, that if, after the expiration of this term, their right to the sole trade should cease, in consequence of three years' previous notice being given by parliament, and the repayment of such sums as should be then due from the public, they should continue a corporation, with power to carry on a free trade in common with other persons.

For some years previous to the termination of the company's charter, the conviction had been gaining ground among all classes, that the trade to the East was capable of being very greatly extended; and that it was solely owing to the want of enterprise and competition, occasioned by its being subjected to a monopoly, that it was confined within such narrow limits. Very great efforts were consequently made by the manufacturing and commercial interests to have the monopoly set aside, and the trade to the East thrown open. The company vigorously resisted these pretensions; and had interest enough to procure a prolongation of the privilege of carrying on an extensive trade to China, to the 10th of April, 1831, with three years' notice; the government of India being continued in their hands for the same period. Fortunately, however, the trade to India was opened, under certain conditions, to the public. The principal of these conditions were, that private individuals should trade, directly only, with the presidencies of Calcutta, Madras, and Bombay, and the port of Penang; that the vessels fitted out by them should not be under 350 tons burden; and that they should abstain, unless permitted by the company or the Board of Control, from engaging in the carrying trade of India, or in the trade between India and China. And yet, in despite of these disadvantages, such is the energy of individual enterprise, as compared with monopoly, that the private traders gained an almost immediate ascendency over the East India Company, and in a very short time, more than trebled our trade with India.

When the question as to the renewal of the charter came again to be discussed in 1832 and 1833, the company had no reasonable objection to urge against their being deprived of the privilege of trading, and the act 3 & 4 Will. IV. c. 85, for continuing the charter till 1854, has terminated the company's commercial cha

racter; by enacting that the company's trade to China should cease on the 22d of April, 1834, and that the company should, as soon as possible after that date, dispose of their stocks on hand, and close their commercial business.

The trade to India, China, and the East generally, is now open to free and unfettered mercantile enterprise. What has been effected since the opening of the trade to India in 1814, notwithstanding the many drawbacks under which it has laboured, is an earnest of what may be anticipated from the new arrangements.

Under this act, the functions of the East India Company are wholly political. She is to continue to govern India, with the concurrence and under the supervision of the Board of Control, till the 30th of April, 1854. All the real and personal property belonging to the company on the 22d of April, 1834, is vested in the crown, and was to be held or managed by the company in trust for the same, subject, of course, to all claims, debts, contracts, &c. already in existence, or that might hereafter be brought into existence by competent authority.

*Hudson's Bay Company.*—This company was incorporated by charter in 1670; but as it was not confirmed by parliament, they have no legal power to exclude any British subjects from trading in the same countries as themselves. The commerce carried on by them is not of great extent, as it seldom employs above four or five ships of about 300 tons each. The articles exported by them are coarse duffle cloth, or blanketing, guns, pistols, sword-blades, hatchets, powder and shot, spirits, &c.; the imports consist of large quantities of beaver-skins and peltry of all kinds, bed-feathers, quilts, castoreum, whalfins, oil, and a few smaller articles.

## Open or Regulated Companies.

The affairs of these companies or associations are managed by directors appointed by the members. They do not, however, possess a common or joint stock. Each individual pays a fine upon entering into the company, and most commonly an annual contribution: a duty applicable to the business of the company is also sometimes charged upon the goods imported and exported from and to the countries with which they trade. A regulated company is, in fact, a device for making those engaged in a particular branch of trade bear the public or political expenses incident to it, at the same time that it leaves them to conduct their own business, with their own capital, and in their own way. The African, the Turkey, or Levant, and some other branches of trade, were for a long time conducted by open or regulated companies.

These, however, have been recently abolished: the African company, by the act 1 & 2 Geo. IV. c. 28, and the Levant company by the act 6 Geo. IV. c. 33.

The regulated companies for foreign commerce, which at present subsist in great Britian, are, the Hamburgh company, the Russia company, and the Eastland company.

*The Hamburgh Company* is the oldest trading establishment in the kingdom; though not always known by that name, nor restrained to those narrow bounds under which it is now confined. It was first called the company of Merchants trading to Calais, Holland, Zealand, Brabant, and Flanders: then it acquired the general title of Merchant-adventurers of England, as being composed of all the English merchants who traded to the Low-countries, the Baltic, and the German ocean. Lastly, it was called the company of Merchant-adventurers of England trading to Hamburgh. This company was first incorporated by Edward I. in 1296; and their privileges have been confirmed by many of his successors. The revolutions which happened in the Low-countries towards the end of the 16th century, and which laid the foundation of the republic of Holland, having hindered the company from continuing their commerce with their ancient freedom, they were obliged to turn it almost wholly to the side of Hamburgh, and the cities on the German ocean; from which the name was changed to that of the Hamburgh company, though the ancient title of Merchant-adventurers is still retained in all their writings.

The *Russian Company* was first projected towards the end of the reign of king Edward VI. and executed in the first and second years of Philip and Mary; but had not its perfection till its charter was confirmed by act of parliament, under queen Elizabeth, in 1566. It had its rise from certain adventurers, who were sent in three vessels on the discovery of new countries, and to find out a north-east passage to China: these, falling into the White Sea, and making up to the port of Archangel, were exceedingly well received by the Muscovites; and at their return, solicited letters patent to secure themselves the commerce of Russia, for which they had formed an association. This company subsisted with reputation almost a whole century, till the time of the civil wars. It is said, the czar then reigning hearing of the death of king Charles I., ordered all the English in his states to be expelled; of which the Dutch taking advantage, settled in their room. After the Restoration the remains of the company re-established part of their commerce at Archangel, but never with the same success as before, the Russians being now well accustomed to the Dutch

merchants and merchandise. The company subsists still, under the direction of a governor, four consuls, and assistants; and by the 10th and 11th of William III. c. 6, the fine for admission was reduced to £5.

The *Eastland Company* was incorporated by Queen Elizabeth. Its charter is dated in the year 1579. By the first article the company is erected into a body politic, under the title of the company of Merchants of the East; to consist of Englishmen, all real merchants, who have exercised the business thereof, and trafficked through the Sound, before the year 1568, into Norway, Sweden, Poland, Livonia, Prussia, Pomerania, &c. excepting Narva, Muscovy, and its dependencies. Most of the remaining articles grant them the usual prerogatives of such companies; as a seal, governor, courts, laws, &c.

## Civic Companies and Corporations.

Exclusive of the companies previously mentioned, a number of ancient companies or corporations exist in this and most other European countries, the members of which enjoy certain political as well as commercial privileges. When the feudal system began to be subverted by the establishment of good order and regular government in the towns, the inhabitants were divided into certain trades or corporations, by which the magistrates and other functionaries were chosen. The members of these trades or corporations, partly to enhance the value of their privileges, and partly to provide a resource, in case of adversity, for themselves, acquired or usurped the power of enacting by-laws regulating the admission of new members, and at the same time set about providing a fund for the support of such as accident or misfortune might reduce to a state of indigence. For a lengthened period these privileges and regulations were very oppressive. Within the last century, however, their influence has been progressively diminishing, and by the passing of the municipal reform act their exclusive privileges have been abolished every where except in London.

The following are the principal companies of the metropolis the Mercers' was incorporated in the 17th of King Richard II. ann. 1393; the Grocers', in the 20th Edward III. ann. 1345; the Drapers', in the 17th Henry VI, ann. 1430; the Fishmongers', in the 28th of Henry VIII. ann. 1536; the Goldsmiths', in the 16th of Richard II. ann. 1392; the Skinners', in the first of Edward III. ann. 1327; the Merchant-taylors', in the 17th Henry VII. ann. 1501; the Haberdashers', or Hurrers', in 26th

Henry VI. ann. 1447, and 17th. Henry VII. ann. 1501; the Salters', in 20th Henry VIII. ann. 1530; the Ironmongers', in 3d Edward IV. ann. 1462; the Vintners', in the reign of Edward III. and 15th Henry VI; and the Clothiers', or Cloth-workers', in 22d Henry VIII.

Besides these there are other very considerable ones; as the dyers, brewers, leather-sellers, pewterers, barbers, surgeons, armourers, white-bakers, wax-chandlers, cutlers, girdlers, butchers, saddlers, carpenters, cordwainers, painters, curriers, masons, plumbers, innholders, founders, embroiderers, poulterers, cooks, coopers, bricklayers, and tilers; also bowers, fletchers, blacksmiths, joiners, plasterers, weavers, fruiterers, scriveners, bottle-makers, and horners; likewise stationers, marblers, wool-packers, farriers, paviors, lorimers or loriners, tallow-chandlers, brown-bakers, wood-mongers, upholsterers, turners, glaziers, clerks, watermen, apothecaries, and throwsters.

## Section III.—Banks.

Banks are establishments intended to serve for a safe custody of money; to facilitate its payment by one individual to another; and, sometimes, for the accommodation of the public with loans. These are commonly divided into two great classes; banks of deposit, and banks of circulation. This division is not, however, a very distinct one; for there is no bank of deposit that is not, at the same time, a bank of circulation, and few or no banks of circulation that are not also banks of deposit. But the term banks of deposit is meant to designate those which keep the money of individuals and circulate it only; while the term banks of circulation is applied to those which do not thus confine their circulation, but issue notes of their own, payable on demand. The Bank of England is the principal bank of circulation in the empire; but it, as well as the private banks of England and Scotland that issue notes, is also a bank of deposit. The private banking establishments in London do not issue notes, and there are many similar establishments in other parts of the country.

The establishment of banks has contributed, in no ordinary degree, to give security and facility to all sorts of commercial transactions. They afford safe and convenient places of deposit for the money that would otherwise have to be kept, at a considerable risk, in private houses. They also prevent, in a great measure, the necessity of carrying money from place to place to make payments, and enable them to be made in the most

convenient and least expensive manner. A merchant or tradesman in London, for example, who employs a banker, keeps but very little money in his own hands, making all his considerable payments by drafts or checks on his banker; and he also sends the various checks, bills, or drafts, payable to himself in London, to his bankers before they become due. By this means he saves the trouble and inconvenience of counting sums of money, and avoids the losses he would otherwise be liable to, and would no doubt occasionally incur, from receiving coins or notes not genuine. Perhaps, however, the great advantage derived by the merchant or tradesman from the employment of a banker, consists in its relieving him from all trouble in respect to the presentation for payment of due bills and drafts. The moment these are transferred to the banker, they are at his risk. And if he either neglect to present them when due, or to have them properly noted in the event of their not being paid, he has to answer for the consequences.

London banking houses are chiefly for deposit. When an account is opened in such a house, that is, when a person pays in money, to be drawn out as may be necessary, he is furnished with a customer's book; on the left hand page the house is entered **Dr.** for the sum paid in, and on the right, it is Cr. for the sums he draws out. In this book the customer never writes himself, but what he pays in is entered by the banker or his clerk, which serves as a receipt; and when the customer wishes to know the state of his accounts at the banker's, or to compare it with his own private note of monies drawn, he gives in his book to be written up or settled. The books generally used in a banking-house are the money-book, in which the cashier enters his receipts and payments of money; the waste-book in which both money and paper, received and paid, are particularly specified: in some houses, however, a book is kept for paper only, called the goldsmith's book. The cash-book follows, containing all the sums of both money and paper paid and received. From this book the ledger is posted, in which each customer is debited from the sums he has drawn out, and credited for those he has paid in. The customer's book is written up from his drafts paid, cancelled, and checked by the account in the ledger. Besides these books, bankers keep others, as the in-bill book, for bills paid in by customers; the out-bill book, for bills sent out for acceptance or payment; the check bill-book, for bills to be brought together that become due on the same day; and the discount bill-book, for all bills discounted: a discount ledger is also kept to show the state of every discount operation. When to this variety of books are added the daily, yearly, and other balances, a banker seems to possess every

possible means for proving and checking his accounts, so that with common care no disorder can ensue. The advantage arising to the London banker (who gives no interest for money placed in his hands for a temporary purpose) chiefly consists in laying out part of the money on good securities, such as in the stocks, or other government paper; and in discounting bills, by which the most essential support is afforded to trade and commerce. Besides this, bankers are of great use to merchants, by undertaking the management of their bills, and other receipts and payments by which the business of the counting-house is materially lessened: and this important branch of business is conducted without any charge and with the strictest accuracy.

Country bankers also take charge of other men's money, discount bills, &c.; but in other respects they differ from London bankers. Some country bankers pay interest for money placed with them, on condition of receiving certain notices before it be drawn out; others keep a neutral interest account, and charge a commission on their payments. Country bankers issue their own notes, (which is not done in London,) payable to bearer on demand; most of them being made payable at some London house where the country banker keeps an account like that of any other private customer.

*Bank of England.*—This great establishment, which has long been the principal bank of deposit and circulation, not in this country only, but in Europe, was founded in 1694. Its principal projector was Mr. William Paterson, an enterprising and intelligent Scotch gentleman, who was afterwards engaged in the ill-fated colony at Darien. Government being at the time much distressed for want of money, partly from the defects and abuses in the system of taxation, and partly from the difficulty of borrowing, because of the supposed instability of the revolutionary establishment, the Bank grew out of a loan of £1,200,000. for the public service, the subscribers, besides receiving eight per cent. on the sum advanced, as interest, and £4,000. a year as the expense of management, in all £100,000. a year, were incorporated into a society, denominated the Governor and Company of the Bank of England: the charter is dated 27th of July, 1694.

The corporation is prohibited from engaging in any sort of commercial undertaking other than dealing in bills of exchange, and in gold and silver. It is authorised to advance money upon the security of goods or merchandize pledged to it; and to sell by public auction, all such as are not redeemed within a specified time. It was also enacted, in the same year in which the bank was established, by statute 6 William & Mary, c. 20., that the

bank, "shall not deal in any goods wares or merchandise (except bullion), or purchase any lands or revenues belonging to the crown, or advance or lend to their majesties their heirs or successors, any sum or sums of money by way of loan or anticipation, or any part or parts branch or branches fund or funds of the revenue now granted or belonging, or hereafter to be granted to their majesties their heirs and successors, other than such fund or funds part or parts branch or branches of the said revenue only, on which a credit of loan is or shall be granted by parliament." And in 1697 it was enacted that the "common capital or principal stock, and also the real fund of the governor and company, or any profit or produce to be made thereof or arising thereby, shall be exempted from any rates taxes assessments or impositions whatever, during the continuance of the bank; and that all the profit benefit and advantage from time to time arising out of the management of the said corporation, shall be applied to the uses of all the members of the said corporation of the governor and company of the Bank of England, rateably and in proportion to each member's part share, and interest in the common capital and principal stock of the said governor and company hereby established."

The charter of the Bank of England, when first granted, was to continue for eleven years certain, or till a year's notice after the 1st of August, 1705. The charter was further prolonged in 1697. In 1708, the Bank having advanced £400,000 for the public service, without interest, the exclusive privileges of the corporation were prolonged till 1733. And in consequence of various advances made at different times, the exclusive privileges of the Bank have been continued by successive renewals, till a year's notice, after the 1st of August 1855, under the proviso that they may be cancelled on a year's notice to that effect being given on the 1st of August, 1845.

The Bank of England has been frequently affected by panics amongst the holders of its notes. In 1745 the alarm occasioned by the advance of the Highlanders under the Pretender as far as Derby, led to a run upon the Bank, and during the tremendous riots in June 1780, the Bank incurred considerable danger. The year 1797 is, however, the most important epoch in the recent history of the Bank. Owing partly to events connected with the war in which we were then engaged—to loans to the Emperor of Germany—to bills drawn on the treasury at home by the British agents abroad—and partly, and chiefly, perhaps, to advances most unwillingly made by the Bank to government, which prevented the directors from having a sufficient control over their issue,—the exchanges became unfavourable in 1795, and in

that, and the following year, large sums in specie were drawn from the Bank. In the latter end of 1796 and beginning of 1797, considerable apprehensions were entertained of invasion, and rumours were propagated of descents having been actually made on the coast. In consequence of the fears that were thus excited, runs were made on the provincial banks in different parts of the country; and some of them having failed, the panic became general, and extended itself to London. Demands for cash poured in upon the Bank from all quarters; and on Saturday, the 25th of February 1797, she had only £1,272,000 of cash and bullion in her coffers, with every prospect of a violent run taking place on the following Monday. In this emergency an order in council was issued on Sunday, the 26th, prohibiting the directors from paying their notes in cash until the sense of parliament had been taken on the subject. And after parliament met, and the measure had been much discussed, it was agreed to continue the restriction till six months after the signature of a definitive treaty of peace. As soon as the order in council prohibiting payments in cash appeared, a meeting of the principal bankers, merchants, traders, &c. of the metropolis, was held at the Mansion-house, when a resolution was agreed to, and very numerously signed, pledging, as had been done in 1745, those present to accept, and to use every means in their power to cause Bank notes to be accepted, as cash in all transactions. This resolution tended to allay the apprehensions that the restriction had excited. Parliament being sitting at the time, a committee was immediately appointed to examine into the affairs of the Bank; and their report put to rest whatever doubts might have been entertained with respect to the solvency of the establishment, by showing that at the moment when the order in council appeared, the Bank was possessed of property to the amount of £15,513,190, after all claims upon it had been deducted.

In 1814, 1815, and 1816, no fewer than 240 country banks stopped payment; and eighty-nine commissions of bankruptcy were issued against these establishments, being at the rate of one commission against every ten and a half of the total number of banks existing in 1813. The great reduction that had been thus suddenly and violently brought about in the quantity of country bank paper, by extending the field for the circulation of Bank of England paper, raised its value in 1817 nearly to a par with gold. The return to cash payments being thus facilitated, it was fixed, in 1819, by the act 59 Geo. III. c. 78, commonly called Mr. Peel's Act, that they should take place in 1823. But to prevent any further over-issue, it was enacted that the Bank should be obliged,

during the interval from the passing of the last act till the return to specie payment, to pay her notes, if required, in bars of standard bullion of not less than sixty ounces weight. This plan was not, however, acted upon during the period allowed by law; for a large amount of gold having been accumulated at the Bank, the directors preferred recommencing specie payments on the 1st of May, 1821.

The Bank of England in its commercial operations is similar to private banks: it takes charge of money, discounts bills; it likewise issues its own notes: it also acts as banker and agent for government, in receiving revenues and paying dividends of stocks and other public debts: it also deals in gold and silver and foreign coins. An account is opened with the bank in the same way as with a private banker, except that in it no cash account is begun with less than £500; nor any discount account opened but by the approbation of the court of directors, and every bill discounted or cashed must have on it two approved names, of persons residing in or near London. The business is under the management of a governor, deputy governor, and twenty-four directors, annually chosen from among the proprietors; and the qualification of a proprietor to vote is, to have been possessed of £500 bank stock, for six months previous to the time of voting.

In England there is the one great national bank already described, with about seventy banking houses in London, and four hundred in the country. By the joint operation of this system of banks the trade and commerce of the nation is carried on, and ultimately almost always in the paper of the bank of England. For since the bank was restricted from paying in specie, its paper, though not made absolutely a legal tender, (that is, though no man can be absolutely compelled to accept it as payment in the place of coin) answers all the purposes of cash, and it is so called in the books of bankers and merchants.

Scotland contains two public banks, the bank of Scotland, and the Royal bank, with many private banks, all nearly on the same principle of English country banks.

Ireland possesses one public bank, the bank of Ireland, and many private banks similar to those above described.

Foreign banks, such as those of Amsterdam, Berlin, Copenhagen, Hamburgh, Venice, Vienna, &c. are called banks of deposit, because the money placed in them is sunk, and never drawn out, but transferred in payments, from one person to another, like stock in the funds of this country. Much of the business of foreign bankers consists in drawing, negotiating, and discounting bills of exchange.

## Section IV.—The Public Funds.

This term was originally applied to the taxes appropriated by parliament to the support of civil government, and the payment of the principal and interest of money borrowed for public service. But the term is now more commonly used for those immense sums which have from time to time been lent to government, and which constitute the national debt; for which the lenders, or their assignees, receive interest from revenues allotted for that purpose. The practice of funding was introduced by the Venetians and Genoese in the sixteenth century, and in some form or other has been adopted since by most of the nations in Europe.

The establishment of the funds was introduced in Great Britain at the revolution; and has since been gradually enlarged, and carried to an amazing extent. When a greater sum has been required for the annual expense than could easily be supplied by annual taxes, the government have proposed terms to their own subjects, or foreigners, for obtaining an advance of money by mortgaging the revenue of future years for their indemnification. This mortgage may either be for a limited period or perpetual. If the sum allotted annually for the benefit of those who advance the money, be considerably greater than the interest of the sum advanced, they may agree to accept such allowance. for a limited time, as a full equivalent. Thus they may either agree for a casual produce of the revenue assigned, or a life annuity for a greater or less number of years; or a life annuity to themselves or nominees; or an annuity for two or more lives; or an annuity with the benefit of survivorship, called a tontine, in which scheme, the whole sum to which the original annuitants were entitled, continues to be distributed among the survivors. Although the debts thus contracted by government are seldom paid for a long term of years, yet any creditor of the public may obtain money for what is due to him, when he pleases, by transferring his property in the funds to another; and regular methods are appointed for transacting these transfers in an easy manner. By means of this, the stocks become a kind of circulating capital; and have the same effect, in some respects, as the circulating money in the nation. When a stockholder transfers his share, he may sometimes be able to obtain a greater price than the original value, and at other times be obliged to accept of a less one. The value of the funds depends on the proportion between the interest they bear, and the benefit which may be obtained by applying the money to other

purposes. It is influenced by the plenty or scarcity of money, and by the quantity of the public debt; and it impaired by any event which threatens the safety, or weakens the credit, of the government. The funds, therefore, in this view of them, may be considered as an index of the public mind, by which, *cæteris paribus*, the prosperity of the nation may be estimated.

The following are the principal funds, which have been established at different periods:—The Aggregate Fund, which was commenced in the year 1715, and had this name given to it, because it consisted of a great variety of taxes, and surpluses of taxes, which were in that year consolidated, and given as the security for discharging the interest and principal of all the Exchequer bills then outstanding.—The South Sea Fund was established in 1716, and was so called because appropriated to pay the interest and allowance for management on the capital of the South Sea Company.—The General Fund was also established in 1716, by making perpetual various duties which had been granted for the term of thirty-two years, and consolidating them, with some other duties, into one fund.—The Sinking Fund consists of the surpluses of the three funds just mentioned, whenever the produce of the taxes composing them should be greater than the charges upon them. The act of parliament by which this was established, expressly ordained that it should be applied to the discharge of the public debt, and to or for none other use, intent, or purpose whatsoever; yet, in the course of a few years, many encroachments were made upon it, and it became at most a mere nominal distinction, the whole produce of it being frequently taken towards the supplies of the current year. An act of parliament was afterwards passed, which directed, that in all future loans an additional sum of 1*l.* per cent. over and above the annual interest, should be raised by taxes towards redeeming the principal; and so enormous has been the expenditure since the passing of that act, that this additional sum amounted to several millions annually, which with the other sums appropriated to the purpose, were employed in the purchase of stock, and in liquidation of the national debt. Notwithstanding which, however, it has continued to increase; and the Sinking Fund has frequently been appropriated to the immediate necessities of the revenue, almost extinguishing the hope that its grand object in relieving the public burdens will ever be accomplished.

The Consolidated Fund was established in consequence of a new arrangement of the public accounts in 1786, when the whole of the public revenue (except the annual grants) was included under this general head. Out of this fund are paid the interest

and expense of management of all the public debts, the interest on Exchequer bills, the civil list, pensions to the royal family, with other salaries and allowances to various public officers; and some miscellaneous annual expenses. The surplus of the produce of the fund, after satisfying all these charges, is annually granted by parliament as part of the ways and means for raising the supplies voted. A small part of the public debt consists of annuities for a certain term of years, commonly called long or short annuities; there are also some life and tontine annuities still existing; but the whole of the terminable annuities bear a very small proportion to the permanent debts. The perpetual annuities are distinguished according to the rate of interest they pay, or the time or purpose of their creation; and when, by a new loan, government contracts an additional debt, bearing a certain fixed interest, and the produce of the taxes imposed for payment of the interest of such new debt being carried to the fund established for paying the interest of the former capital, the old and new debts are consolidated, and the whole interest made payable out of the general produce of the fund: hence we have three or four per cent. consolidated annuities, according to the rate of interest payable on the capital. The interest on all the public debts was formerly paid at the Exchequer; but the Bank being found a much more convenient place for this purpose, nearly the whole is now payable there; the company receiving a certain allowance from government for managing all business relative to the public funds.

The principal denominations of the funds transferable at the Bank of England, &c., and the times when the interest or dividend becomes due, are as follow:—

FUNDS.

| | |
|---|---|
| Consolidated three per cent. annuities . . . . . | *Jan.* 5, and *July* 5. |
| Three per cent. annuities, 1726 . . . . . | |
| Three and a half per cent. annuities, new . . | |
| Annuities ending January 1860 . . . . . | |
| Bank Stock . . . . . | *April* 5, and *Oct.* 10. |
| Reduced three per cent. annuities . . . . . | |
| Reduced three and a half per cent. annuities | |
| Three and a half per cent. annuities, 1818 . | |
| Annuities ending October 1859 . . . . . | |
| Long annuities . . . . . | |

TRANSFERABLE AT THE SOUTH SEA HOUSE.

| | |
|---|---|
| South Sea Stock ..... | *Jan.* 5, and *July* 5. |
| New South Sea annuities ..... | |
| Three per cent. annuities ..... | |
| Old South Sea Annuities ..... | *April* 5, & *Oct.* 10. |

Besides the above, there are several foreign funds, the transactions of which are carried on at the Stock Exchange, on the same general principles as the English funds; as the Spanish, Portuguese, Brazilian, &c.; but the interest of some of these is very irregularly paid.

The above information may be useful in forming an estimate of the magnitude and importance of the commercial transactions of Great Britain.

In carrying on these affairs in any establishment, besides a knowledge of the principles laid down in Sect. I., the greatest precision is needful as to the mode of keeping accounts, &c. A few useful hints on this subject, as well as an account of some of the principal usages in connexion with it, are subjoined.

## Section V.—Book-keeping.

A MERCHANT's books should exhibit the true state of his affairs; they should show the particular success of each transaction, as well as the general result of the whole; and should afford a correct and ready information upon every subject, for which they may be consulted. Books may be kept either by single or double entry. Single entry is chiefly used in retail business. It is the most simple and concise method of book-keeping, but not the most perfect, being defective in some essential particulars. Double entry is used in wholesale and mercantile affairs, whence it is called merchants' accounts. This method is universally preferred in extensive commerce, being the most comprehensive in its principles, and the most certain in its conclusions.

## SINGLE ENTRY.

In books of single entry, only such articles are entered as are bought or sold on credit: no account being kept of those bought or sold for ready money, or other immediate payment. The consequence of this is, that the books can furnish no complete statement of the trader's concerns, unless assisted by taking the stock of goods remaining unsold, and so calculating the amount of gain or loss on his transactions. In keeping accounts by single entry, two books are essential, the day-book and the ledger; to these are sometimes now added a cash-book, bill-book, and ledger, for goods bought.

DAY-BOOK.—The day-book, or, as it is sometimes called, the waste-book, should be ruled with three lines for the pounds, shillings, and pence, and one marginal line for the folio of the ledger, or cash-book; the day of the week, month, and year to be inserted, each day in which any business is done, in the middle of the page. In the day-book should be entered all goods sold and not paid for, with the name of the parties to whom it is sold, in the following manner:—

| 3 | | £ | s. | d. |
|---|---|---|---|---|
| | *Monday, Jan.* 1, 1840. | | | |
| | Mr. J. CRAWFORD, High Street. | | | |
| 1 | 6 *lb.* fine black Tea, at - - - 7*s.* 6*d.* | 2 | 5 | 0 |
| | ¼ *cwt.* Sugar, at - - - - - 112*s.* | 1 | 8 | 0 |
| | | 3 | 13 | 0 |
| | *Tuesday, Jan.* 2, 1840. | | | |
| | Messrs. COLE & BROWN, Ship Lane. | | | |
| 2 | 30 *pieces* fine Irish, 715 *yds.* at - 4*s.* | 143 | 0 | 0 |
| | *Friday, Jan.* 5, 1840. | | | |
| | Mrs. WILLIAMS, Broad Street. | | | |
| 3 | 6 *lb.* Malagas, at - - - - - 12*d.* | 0 | 6 | 0 |
| | 6 *lb.* Currants, at - - - - - 13*d.* | 0 | 6 | 6 |
| | | 0 | 12 | 6 |

Ledger.—From the day-book, every article must be posted into the ledger; and as in the day-book, the head or title of each is the day of the week, month, and year; so in the ledger, the head or title of every article is the name of the person or firm to whom it was sold. It must be ruled with two separate divisions, the left hand for debtor, and the right for creditor; each division to contain a narrow column for the day of the month on the left hand, then leaving a space for the articles sold, draw a line for the folio of the day-book, or cash-book, and to the right of each division, three lines for pounds, shillings, and pence. In posting from the day-book into the ledger, the name of the person or firm must be first written in a large hand at the head of the page; the day of the month, &c. in the first column; the goods sold, in the space between that and the lines of the folio, and the amount carried out to the column for that purpose.

1 *Dr.* Mr. J. Crawford, High Street. *Cr.*

| 1840. | | | £ | s. | d. | 1840. | | | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Jan.* 1. | To goods . | 3 | 3 | 13 | 0 | *Jan.* 16. | By cash . | 1 | 3 | 13 | 0 |

2 *Dr.* Messrs. Cole & Brown, Ship Lane. *Cr.*

| 1840. | | | £ | s. | d. | 1840. | | | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Jan.* 2. | To goods . | 3 | 143 | 0 | 0 | *Feb.* 18. | By cash . | 1 | 50 | 0 | 0 |

3 *Dr.* Mrs. Williams, Broad Street. *Cr*

| 1840. | | | £ | s. | d. | 1840. | | | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Jan.* 5. | To goods . | 3 | 0 | 12 | 6 | *Mar.* 4. | By cash . | 1 | 0 | 12 | 6 |

Cash-Book.—The cash-book must be ruled in the same manner as the ledger, and must contain a debtor and creditor account; the cash must be made debtor for all monies received, and creditor for all monies paid; and it should be balanced regularly once in a week or month, according to the number of entries the business may require.

In the cash-book, all monies received for goods previously carried to account in the ledger, must be made received in the name of the person or firm who pays it, with the day of the month, &c. in the margin. It must then be posted from thence to the credit of such person or firm in the ledger, with reference to the folio of each, in the same manner as from the day-book. But this may be seen more fully by the following specimen of a cash-book entry, connected with the foregoing specimen of a ledger entry:—

*Dr.* CASH. CONTRA. *Cr.*

| 1 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1840. | | | £ | s. | d. | 1840. | | £ | s. | d. |
| Jan. 1 | To Balance - - | | 101 | 6 | 8 | Jan 1. | House expenses | 5 | 0 | 0 |
| 16. | James Crawford - | 1 | 3 | 13 | 0 | 5. | House repairs - | 24 | 6 | 3 |
| 25. | Sundries - - - | | 5 | 6 | 4 | 25. | Carrick & Maclean, on acct. | 76 | 3 | 0 |
| Feb. 18. | Cole and Brown, on account - | 2 | 50 | 0 | 0 | | | 105 | 9 | 3 |
| Mar. 4. | Mrs. Williams - | | 0 | 12 | 6 | | Balance - - - | 66 | 5 | 4 |
| 25. | Sundries - - - | | 4 | 8 | 10 | | | | | |
| 31. | Ditto - - - - | | 6 | 7 | 3 | | | | | |
| | | | 171 | 14 | 7 | | | 171 | 14 | 7 |
| April 1. | Bal. brought for. | | 66 | 5 | 4 | | | | | |

It is necessary here to remark, that in keeping accounts by single entry, the cash-book will be liable to some entries which are not to be charged to the account of any other person or firm; such as all monies paid for various expenses which exclusively belong, and are incidental to every concern, and also all sums received in retail shops, &c. under the name of sundries. It will be desirable, therefore, to open an account in the ledger for each of these, by which means, every article in the cash-book will be posted somewhere; and it will be also seen at one view the

amount of expenses for the year. If the money should be paid for goods not posted in the ledger, it will be perfectly satisfactory to enter it in the cash-book, and refer it from thence to the day-book, without its appearing in the ledger at all.

Besides the incidental expenses, there will often appear on the credit side of the cash-book sums of money paid to certain houses for goods bought; these, where the business is large enough to require it, should be posted in a ledger appropriated to the entry of such goods, commonly called a bought ledger; see an article in the foregoing specimen, "Carrick and Maclean, on account, £6 3*s*."

In addition to the books already mentioned, it will be also necessary in many instances to keep a bill-book, and a separate ledger for the entry of goods bought.

Bill-Book.—The bill-book must be ruled so as to take a particular account of all bills, both receivable and payable, such as the time, date, from whom received, to whom payable, &c. that it may be seen at one view what bills have been drawn on you, and when they must be provided for; and also what bills you may have by you drawn on other persons, that they may be presented at proper times, and that you may not lose your claim upon their drawers or accepters, by allowing them to remain till overdue. The forms of bills, and some general rules respecting them, will be given elsewhere.

Bought Ledger.—The ledger for goods bought must be ruled in the same manner as the other ledger, and the goods you receive at various times must be entered to the credit of the several houses from whom they are bought, copying the amount from the invoices, which of course are previously agreed with the goods actually received; the sums of money paid to such houses will all appear in the cash-book when paid, and be posted from thence to the debit of each account.

## DOUBLE ENTRY.

This method, called also the Italian method, has generally been preferred in merchants' accounts on a large scale, as being founded upon the most universal principles; and the accountant who understands it, will find little difficulty in following, or even in inventing, other methods that are better accommodated to any particular purpose.

The Italian method requires three principal books; the waste-book, journal, and ledger.

Waste Book.—The waste-book, or day-book, contains an exact register of all occurrences in business, in the same order as they take place. It begins with an inventory of every thing belonging to the owner, a list of the debts due to him, and of the debts he owes to others: it is carried on with a full relation of all the money he receives or pays, of all the goods he buys or sells, and of every other occurrence in his business. Each article should be entered as soon as the transaction takes place, and should be clearly expressed in the plainest language. It should require no supply from the accountant's memory, but should be fully intelligible to any person, however unacquainted with the business; at the same time it should be written with all convenient brevity; and, therefore, sometimes refers to invoices and other accounts, for particulars. The accountant's first care should be to have nothing defective or ambiguous; his second, to have nothing superfluous. The articles are separated from each other by a line; and the transactions of one day are separated from those of another by a double line, in the middle of which there is left a blank space for inserting the day of the month. This book must be kept with the greatest care, as it contains the materials from which the other books are composed; and any error or defect will occasion a like one in the others. Besides, it is the book whose authority is trusted to, and which must be exhibited to judges, or arbiters, when an account is disputed. As the journal is filled up from the waste-book, the authority of the latter is estimated more authentic, unless there be an obvious mistake through hurry; and either of these books is depended on rather than the ledger, which, from its form is more liable to error, and may be more easily vitiated by a fraudulent design.

The Journal contains an account of the same transactions, but expressed in a more artificial way, so as to point out the debtor and creditor in each case, and thereby to prepare the several articles for entrance in the ledger. In stating the debtor and creditor in an account, the following general rules are to be observed. 1. That every article received, or every person accountable to us, is called the debtor. 2. That every article delivered, or every person to whom we are accountable, is the creditor. Or more particularly:—the person to whom, or for whom we pay money, or furnish goods, is the Dr.; and the person from whom, or for whom, we receive money or goods, is the Cr. Every thing which comes into our possession, or under our direction, is the Dr.; and every thing which goes out of our possession, or from under our direction, is the Cr.

The following cases comprehend the most common occurrences in merchants' accounts. 1. The person to whom any thing or article is delivered becomes Dr. to the thing or article delivered when nothing is received in return. 2. A thing received is Dr. to the person from whom it is received, when nothing is delivered in return. 3. A thing received is Dr. to the thing given for it. 4. Goods and all other real accounts, that is such as relate to property of every sort, are Drs. for all charges incurred for their sake. 5. When any profits are received from real accounts, as rents of houses, freights of ships, bounties or drawbacks on goods exported or imported, and the like, cash becomes Dr. for the amount received, to the account or article from which the profit is derived. 6. When any loss is sustained, the account of profit and loss, or some other account of the same import, is Dr. to cash for the amount. 7. When any profit or gain arises, but not from any real account, cash, the article received, or the person accountable for the profit, is Dr. to the account of profit and loss, or to some other account of the same nature. for the amount. 8. When one person pays money, or delivers any thing to another person, on account, the receiver is Dr. to the person who pays or delivers.

The Ledger.—In this book all transactions belonging to one person or one article of merchandise are collected together and entered as they occur, under one head, expressing the person or thing concerned in the account: and as in every transaction there must be a Dr. and Cr. the occurrence is entered in the accounts of both, on opposite sides; a circumstance from which book-keeping by double entry has obtained its name. All accounts in the ledger are either real, personal, or fictitious. In personal accounts the person is entered Dr. or Cr. according to the nature of the transaction, as is done in accounts kept by single entry. In real accounts each article is entered on the Dr. or Cr. side agreeably to the entries in the journal. In fictitious accounts all articles appear to have relation to stock, or to profit and loss. By stock is meant the merchant himself to whom the books belong; for his name never appears in his own books. On the Dr. side of this account appears the debts owing by the merchant; while on the Cr. side appears the monies due to him, with cash, goods, ships, and all other property belonging to him, in the outset of his business and books. By profit and loss, is understood whatever may be gained or lost in business: the Dr. side showing the loss, and the Cr. side the gain upon every transaction. The following is a specimen of the mode of keeping a set of books by a double entry, or the Waste-book, Journal, and Ledger.

## WASTE-BOOK.

FOLIO 1.

*Inventory of the Money, Goods, and Debts, due to or by James Campbell, Merchant, London.*

| | | | £ | s. | d |
|---|---|---|---|---|---|
| | January 1, 1840. | | | | |
| 1 | Ready money ..... | £2000 0 0 | | | |
| | 225 yards of broad-cloth, at 20*s.* a yard ..... | 225 0 0 | | | |
| | 1000 yards of linen, at 3*s.* a yard | 150 0 0 | | | |
| | 16 puncheons of rum, at £50 a puncheon ..... | 800 0 0 | | | |
| | $\frac{3}{8}$ Ship Diligence..... | 450 0 0 | | | |
| | John Reynolds owes me per bond with interest at 5 per cent., from the 1st of September last ..... | 500 0 0 | | | |
| | | | 4125 | 0 | 0 |
| | *List of Debts.* | | | | |
| 1 | To John Edwards on demand .. | 150 0 0 | | | |
| | Edward Jones, per account.. | 135 10 6 | | | |
| | | | 285 | 10 | 6 |
| | 7. | | | | |
| 1 | Paid John Edwards in Full ..... | | 150 | 0 | 0 |
| | 12. | | | | |
| 1 | Bought of Edward Jones 500 yards of broad-cloth at 20*s.* a yard ..... | | 500 | 0 | 0 |
| | 20. | | | | |
| 1 | Sold 150 yards of linen at 3*s.* 2*d.* a yard .. | | 23 | 15 | 0 |
| | 30. | | | | |
| 1 | Bartered 5 puncheons of rum, at £50 per puncheon, for 25 hhds. of Lisbon wine, at £10 a hhd. ..... | | 250 | 0 | 0 |
| | Feb. 2. | | | | |
| 1 | Sold William Beddome 72 yards of broad-cloth, at 25*s.* a yard ..... | | 90 | 0 | 0 |
| | 6. | | | | |
| 1 | Shipped on board the Yarmouth, Captain Blake, for Jamaica, the following goods, addressed to Matthew Fysh on my account, namely— | | | | |
| | 700 yards of linen, at 3*s.* a yard.. | 105 0 0 | | | |
| | 200 ——— broad-cloth, at 20*s.* . | 200 0 0 | | | |

## WASTE-BOOK.

FOLIO 2.

| | | | | £ | s | d. |
|---|---|---|---|---|---|---|
| | 8 pieces of Holland, bought of William Beddome, at £19 a piece ..... | 152 | 0 0 | | | |
| | Paid duty and fees, &c. ..... | 16 | 4 2 | | | |
| | Ditto for insurance of £400 by John Rickman and Co. at 5 per cent. ..... | 20 | 0 0 | | | |
| | | | | 493 | 4 | 2 |
| | Feb. 27. | | | | | |
| 2 | Paid Edward Jones in full ..... | | | 635 | 10 | 6 |
| | 28. | | | | | |
| 2 | Paid my servants their quarter's wages, which, together with the expenses of my house, &c. for the last quarter, is in all .. | | | 93 | 4 | 10 |
| | March 10. | | | | | |
| T G No. | Shipped on board the Trident, John Jones, master, by order, and for account of Theophilus Grimaldi, merchant in Leghorn, the following goods, marked and numbered as per margin, namely, | | | | | |
| 1 2 | 200 yards my own broad-cloth, 25*s.* ..... | 250 | 0 0 | | | |
| 2 | 10 ton lead, bought for ready money, at £16 4*s.* ..... | 162 | 0 0 | | | |
| | 16 pieces drugget, at £7 7*s.* bought of John Edwards .. | 117 | 12 0 | | | |
| | Paid Custom and other charges till on board ..... | 12 | 8 7 | | | |
| | Paid John Rickman and Co. for insuring £400 on the whole . | 10 | 10 0 | | | |
| | My Commission on ditto, at $2\frac{1}{2}$ per cent. ..... | 11 | 1 3 | | | |
| | | | | 563 | 11 | 10 |
| | 16. | | | | | |
| 2 | The owners of the ship Diligence have settled the accounts, and paid me my share of neat gain from Michaelmas to Lady-day ..... | | | 94 | 13 | 8 |
| | 17. | | | | | |
| 2 | Received of John Reynolds for a half-year's interest of £500 due the 1st inst. ..... | | | 12 | 10 | 0 |
| | 25. | | | | | |
| | Drawn my bill on Theophilus Grimaldi, in Leghorn, for 1200 piastres, at 53*d.* each, payable to Enoch Francis, or order, value here received ..... | | | 250 | 0 | 0 |

# JOURNAL.

FOLIO 1.

| | | | | | £ | s. | d. |
|---|---|---|---|---|---|---|---|
| | January 1, 1840. | | | | | | |
| | *Sundries Dr. to Stock* £4125. | | | | | | |
| 1 | Cash for ready money ..... | 2000 | 0 | 0 | | | |
| 1 | Broad-cloth, for 225 yards at 20*s.* a yard ..... | 225 | 0 | 0 | | | |
| 2 | Linen, for 1000 yards, at 3*s.* a yard ..... | 150 | 0 | 0 | | | |
| 2 | Rum, for 16 puncheons, at £50 a puncheon ..... | 800 | 0 | 0 | | | |
| 2 | Ship Diligence, for $\frac{3}{8}$ cost .... | 450 | 0 | 0 | | | |
| 2 | John Reynolds, per bond bearing interest at 5 per cent. from the 1st of September.. | 500 | 0 | 0 | | | |
| 1 | | | | | 4125 | 0 | 0 |
| 1 | *Stock Dr. to Sundries* £285 10 6. | | | | | | |
| 2 | To John Edwards on demand.. | 150 | 0 | 0 | | | |
| 2 | To Edward Jones, per account. | 135 | 10 | 6 | 285 | 10 | 6 |
| | 7. | | | | | | |
| 2 | *John Edwards Dr. to Cash* £150. | | | | | | |
| 1 | Paid him if null ..... | | | | 150 | 0 | 0 |
| | 12. | | | | | | |
| 1 | *Broad-Cloth Dr. to Edward Jones* £500. | | | | | | |
| 2 | For 500 yards, at 20*s.* a yard..... | | | | 500 | 0 | 0 |
| | 20. | | | | | | |
| 1 | *Cash Dr. to Linen* £23 15. | | | | | | |
| 2 | For 150 yards, at 3*s.* 2*d.* a yard..... | | | | 23 | 15 | 0 |
| | 30. | | | | | | |
| 2 | *Lisbon Wine Dr. to Rum* £250. | | | | | | |
| 2 | For 25 hhds. at £10 a hhd. received in barter for 5 puncheons, at £50 a puncheon .... | | | | 250 | 0 | 0 |
| | Feb. 2. | | | | | | |
| 3 | *William Beddome Dr. to Broad-Cloth* £90. | | | | | | |
| 1 | For 72 yards, at 25*s.* a yard ..... | | | | 90 | 0 | 0 |
| | 6. | | | | | | |
| | *Voyage to Jamaica Dr. to Sundries* £493 4 2. | | | | | | |
| 2 | To linen, 700 yards, at 3*s.* ..... | 105 | 0 | 0 | | | |
| 2 | To broad-cloth, 200 yards, at 20*s.* | 200 | 0 | 0 | | | |

## JOURNAL.

FOLIO 2.

| | | | £ | s. | d. |
|---|---|---|---|---|---|
| | *Brought forward* | 305 0 0 | | | |
| 1 / 2 | To William Beddome, for 8 pieces of Holland, at £19..... | 152 0 0 | | | |
| 1 | To cash, for duty, insurance, &c. | 36 4 2 | 493 | 4 | 2 |
| | Feb 27. | | | | |
| 3 / 1 | *Edward Jones Dr. to Cash* £635 10 6. | | | | |
| | Paid him in full ..... | | 635 | 10 | 6 |
| | 28. | | | | |
| | *Profit and Loss Dr. to Cash* £93 4 10. | | | | |
| 2 / 1 | For servants' wages, with house and pocket expenses during the last quarter..... | | 93 | 4 | 10 |
| | March 10. | | | | |
| | *Theophilus Grimaldi's Account Current Dr. to Sundries* £563 11 10. | | | | |
| 2 | To broad-cloth, 200 yards at 25*s.* | 250 0 0 | | | |
| 1 / 1 | To cash for 10 tons lead, at £16 4*s.* with charges..... | 184 18 7 | | | |
| 2 / 2 | To John Edwards, for 16 pairs druggets, at £7 7*s*..... | 117 12 0 | | | |
| 2 | Profit and loss for my commission | 11 1 3 | 563 | 11 | 10 |
| | 16. | | | | |
| | *Cash Dr. to Ship Diligence* £94 13 8. | | | | |
| 1 / 2 | For my share of the neat gain from Michaelmas to Lady-day ..... | | 94 | 13 | 8 |
| | 17. | | | | |
| | *Cash Dr. to Profit and Loss* £12 10. | | | | |
| 1 / 2 | For half year's interest on £500 of John Reynolds ..... | | 12 | 10 | 0 |
| | 25. | | | | |
| | *Cash Dr. to Theophilus Grimaldi's Account* £250. | | | | |
| 1 / 2 | Drawn my bill on him for 1200 piastres at 50*d.* each, payable to Enoch Francis or order, value received ..... | | 250 | 0 | 0 |

## LEDGER.

| 1840. | (1) *Dr.* *Stock.* | fol. | £ | *s.* | *d.* | 1840. | *Cr.* | fol. | £ | *s.* | *d.* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan. 1. | To Sundries, as per Journal..... | | 285 | 10 | 6 | Jan. 1. | By Sundries, as per Journal..... | | 4125 | 0 | 0 |
| | To Balance, for my neat worth.... | 2 | 3973 | 14 | 7 | | By Profit and Loss, neat gain .... | 2 | 134 | 5 | 1 |
| | | | 4259 | 5 | 1 | | | | 4259 | 5 | 1 |
| | *Dr.* *Cash.* | | | | | | *Cr.* | | | | |
| Jan. 1. | To Stock ..... | 1 | 2000 | 0 | 0 | Jan. 7. | By John Edwards ..... | 2 | 150 | 0 | 0 |
| 20. | To Linen ..... | 2 | 23 | 15 | 0 | Feb. 6. | By Voyage to Jamaica ..... | 2 | 36 | 4 | 2 |
| Mar. 16. | To Ship Diligence..... | 2 | 94 | 13 | 8 | 27. | By Edward Jones ..... | 2 | 635 | 10 | 6 |
| 17. | To Profit and Loss..... | 2 | 12 | 10 | 0 | 28. | By Profit and Loss ..... | 2 | 93 | 4 | 10 |
| 28. | To Theophilus Grimaldi's Account | 2 | 250 | 0 | 0 | Mar. 8. | By T. Grimaldi's Account ..... | 2 | 184 | 18 | 7 |
| | | | 2380 | 18 | 8 | | By Balance Cash in my hands .... | 2 | 1281 | 0 | 7 |
| | | | | | | | | | 2380 | 18 | 8 |
| | *Dr.* *Broad-cloth.* | | | | | | *Cr.* | | | | |
| | | yds. | | | | | | yds. | | | |
| Jan. 1. | To Stock, at 20*s.* a yard..... | 225 | 1 | 225 | 0 | 0 | Feb. 2. | By Wm. Beddome, at 25*s.* a yd. | 72 | 2 | 90 | 0 | 0 |
| 12. | To Edward Jones, at 20*s.*..... | 500 | 2 | 500 | 0 | 0 | 6. | By Voyage to Jamaica, at 25*s.* | 160 | 2 | 200 | 0 | 0 |
| | | 725 | | | | | Mar. 8. | By T. Grimaldi's Account Current 25*s.* ..... | 200 | 2 | 250 | 0 | 0 |
| | To Profit and Loss gained ..... | | 2 | 108 | 0 | 0 | | By Balance at 20*s*..... | 293 | 2 | 293 | 0 | 0 |
| | | | | 833 | 0 | 0 | | | 725 | | 833 | 0 | 0 |
| | *Dr.* *Linen.* | | | | | | | *Cr.* | | | | | |
| | | yds. | | | | | | | yds. | | | | |
| Jan. 1. | To Stock, at 3*s.* a yard ..... | 1000 | 1 | 150 | 0 | 0 | Jan. 20. | By Cash, at 3/2 per yard .... | 150 | 1 | 23 | 15 | 0 |
| | | | | | | | Feb. 6. | By Voyage to Jamaica, at 3*s.* | 700 | 2 | 105 | 0 | 0 |
| | To Profit and Loss gained..... | | 2 | 1 | 5 | 0 | | By Balance, at 3*s*..... | 150 | 3 | 22 | 10 | 0 |
| | | | | 151 | 5 | 0 | | | 1000 | | 151 | 5 | 0 |

| 1840. | (2) *Dr.* *Rum.* | | fol. | £ | s. | d. | 1840. | *Cr* | | fol. | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | pun. | | | | | | | pun. | | | | |
| Jan. 1. | To Stock, at £50 per puncheon | 16 | 1 | 800 | 0 | 0 | Jan. 30. | By Lisbon Wine, at £50 a pun. | 5 | 1 | 250 | 0 | 0 |
| | | | | | | | | By Balance at £50 a pun. .... | 11 | 2 | 550 | 0 | 0 |
| | | | | | | | | | 16 | | 800 | 0 | 0 |
| | *Dr.* *Ship Diligence.* | | | | | | | *Cr.* | | | | | |
| Jan. 1. | To Stock for $\frac{3}{8}$ ..... | | 1 | 450 | 0 | 0 | Mar. 15. | By Cash for my share gained .... | | 1 | 94 | 13 | 8 |
| | To Profit and Loss gained ..... | | 2 | 94 | 13 | 8 | | By Balance rem. $\frac{5}{8}$..... | | 2 | 450 | 0 | 0 |
| | | | | 544 | 13 | 8 | | | | | 544 | 13 | 8 |
| | *Dr.* *John Reynolds.* | | | | | | | *Cr.* | | | | | |
| Jan. 1. | To Stock ..... | | 1 | 500 | 0 | 0 | | By Balance due by him..... | | 2 | 500 | 0 | 0 |
| | *Dr.* *John Edwards.* | | | | | | | *Cr.* | | | | | |
| Jan. 7. | To Cash in full ..... | | 1 | 150 | 0 | 0 | Jan. 1. | By Stock ..... | | 1 | 150 | 0 | 0 |
| | To Balance due to him..... | | 2 | 117 | 12 | 0 | Mar. 8. | By T. Grimaldi's Account Current | | 2 | 117 | 12 | 0 |
| | | | | 267 | 12 | 0 | | | | | 267 | 12 | 0 |
| | *Dr.* *Edward Jones.* | | | | | | | *Cr.* | | | | | |
| Feb. 27. | To Cash ..... | | 1 | 635 | 10 | 6 | Jan. 1. | By Stock ..... | | 1 | 135 | 10 | 6 |
| | | | | | | | 12. | By Broad-cloth ..... | | 1 | 500 | 0 | 0 |
| | | | | | | | | | | | 635 | 10 | 6 |
| | *Dr.* *Lisbon Wine.* | | | | | | | *Cr.* | | | | | |
| | | hhd. | | | | | | | hhd. | | | | |
| Jan. 20. | To Rum at £10 a hhd. ..... | 25 | 2 | 250 | 0 | 0 | | By Balance, at £10 a hhd.... | 25 | 2 | 250 | 0 | 0 |
| | *Dr.* *William Beddome.* | | | | | | | *Cr.* | | | | | |
| Feb. 2. | To Broad-cloth ..... | | 1 | 90 | 0 | 0 | Feb. 6. | By Voyage to Jamaica ..... | | 2 | 152 | 0 | 0 |
| | To Balance due to him..... | | 2 | 62 | 0 | 0 | | | | | | | |
| | | | | 152 | 0 | 0 | | | | | | | |

| 1840. | (3) *Dr.* *Voyage to Jamaica.* | fol. | £ | s. | d. | 1840. | *Cr.* | fol. | £ | s. | d. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Feb. 6. | To Sundries, as per Journal..... | | 493 | 4 | 2 | | By Balance..... | 2 | 493 | 4 | 2 |
| | *Dr. T. Grimaldi's Acc. Cur.* | | | | | | *Cr.* | | | | |
| Mar. 8. | To Sundries, as per Journal..... | | 563 | 11 | 10 | Mar. 25. | By Cash ..... | 1 | 250 | 0 | 0 |
| | | | | | | | By Balance due by him..... | 2 | 313 | 11 | 10 |
| | | | | | | | | | 563 | 11 | 10 |
| | *Dr.* *Profit and Loss.* | | | | | | *Cr.* | | | | |
| Feb. 28. | To Cash for house expenses, &c... | 1 | 93 | 4 | 10 | Mar. 1. | By T. Grimaldi's Account Current | 2 | 11 | 1 | 3 |
| | | | | | | 17. | By Cash for interest of £500 .... | 1 | 12 | 10 | 0 |
| | | | | | | | By Broad-cloth gained ..... | 1 | 108 | 0 | 0 |
| | | | | | | | By Linen gained ..... | 2 | 1 | 5 | 0 |
| | | | | | | | By Ship Diligence gained..... | 2 | 94 | 13 | 8 |
| | Stock, neat gain..... | 1 | 134 | 5 | 1 | | | | 227 | 9 | 11 |
| | *Dr.* *Balance.* | | | | | | *Cr.* | | | | |
| | To Cash in my hands ..... | 1 | 1281 | 0 | 7 | | By John Edwards, due to him.... | 2 | 117 | 12 | 0 |
| | To Broad-cloth, 293 yards, at 20*s.* | 1 | 293 | 0 | 0 | | By Wm. Beddome, due to him.... | 2 | 62 | 0 | 0 |
| | To Linen, 150 yards, at 3*s.* ..... | 2 | 22 | 10 | 0 | | | | | | |
| | To Rum, 11 pun. at £50..... | 2 | 550 | 0 | 0 | | | | | | |
| | To Ship Diligence for $\frac{5}{8}$ ..... | 2 | 450 | 0 | 0 | | | | | | |
| | To John Reynolds, due by him .. | 2 | 500 | 0 | 0 | | | | | | |
| | To Lisbon Wine, 25 hhds. at £10 | 2 | 250 | 0 | 0 | | | | | | |
| | To Voyage to Jamaica ..... | 2 | 493 | 4 | 2 | | | | | | |
| | To T. Grimaldi's Acc. Cur. due by him ..... | 2 | 313 | 11 | 10 | | By Stock, for my neat worth .... | 1 | 3973 | 14 | 7 |
| | | | 4153 | 6 | 7 | | | | 4153 | 6 | 7 |

The books should be written up as frequently as can be done conveniently; so that the journal may keep pace nearly with the waste-book, and the ledger with the journal. Each book should be carefully revised, and compared with the book from which it is posted, and corresponding marks placed to each article as you proceed, to show how far it has been examined. Having made these preparations, proceed to balance the several accounts, and close the books thus: Let all accounts have their sums of money on both sides added up in two totals: but before these totals are set down, if they be unequal, let the sides be made equal (that is, balanced) by writing down on the lighter side as much as will make it equal on the heavier, which sum is generally charged debtor to, or creditor by either profit and loss or balance, these being the two accounts by which most others are balanced: all cases, in which any thing is either gained or lost, being balanced by means of profit and loss; and all those in which goods or any thing remains in your hands, or in which any thing is due to or by you, are closed by means of the balance account, which is drawn out at the end of the ledger to receive all such balances; and the articles closed by profit and loss being carried to the profit and loss account By these means all the gains and losses are collected into one place under the title of profit and loss; and all the effects and debts into another, under the title of balance; and therefore by closing or balancing these two general accounts by means of the stock account, and carrying the two equalling sums to their proper sides of the stock account, those two sides then added up will be exactly equal to each other; otherwise the work is somewhere wrong, and must be examined till the error be rectified.

In book-keeping by double entry as well as that by single entry, many accounts in the ledger must be simplified and shortened, by employing sundry assisting or subsidiary books, each set apart for particular branches of business. Of these the principal are the Cash-book, the Bill-book, the Sales-book, the Invoice-book, &c., forming so many parts of the waste-book, for those articles belonging to the respective subject of each subsidiary book. By this method the proper waste-book will comprise only a general statement of transactions noticed in the subsidiary books: with particular specifications of those transactions alone for which no other books are kept. By this process, and by balancing those smaller books at stated periods, monthly or otherwise, the entries in the ledger are greatly diminished in number. Persons employed to import or export goods on commission, or for the account of others, must at all times keep books of Invoice and Sale: and

Cash and Bill-books are indispensable in every branch of mercantile concerns.

The Cash-book contains an account of all money matters, kept in the same way with the cash account in the foregoing specimen; the Dr. side showing all monies received, and the Cr. side all monies paid or expended. This book contains all such issues or receipts of money as being merely temporary, like small loans, occasional accommodations to neighbours in trade, &c. need not appear formally in the regular journal and ledger. The Bill-book exhibits a register of all bills of exchange, both payable and receivable: it is divided into columns set apart for the several particulars relative to each bill, such as when received, by whom drawn, on whom drawn, the date, to whom payable, the time when due, the sum, &c. &c.

The Invoice-book contains copies of all invoices or statements of goods sent off or exported on commission; containing the name of the ship and the master, the place of destination, the person to whom the goods are consigned. Then follows a statement of the quantities and values of the several articles despatched, and of the charges for shipping the goods, or for other purposes, paid by the merchant, the exporter, or the factor. Upon the total amount of all these expenditures is charged the commission or allowance for the trouble of the exporter.

The Sales-book, or Factory-book points out the neat or (as it is usually written) the net proceeds, or the exact money, arising from the sale of any article or merchandise, when all expenses are deducted, and when that sale has been made upon consignment or commission. This is also called the account of sales, or more commonly the account-sales; and it is divided like the accounts in the ledger, into two opposite pages forming one folio, with the title extending across both. On the left hand are entered all charges attending the transactions, such as those for freight, custom-house dues, landing, warehousing, selling, &c. On the same side appear also the broker's charges and the factor's commission, both of which are reckoned up in the gross or total amount of the sales. On the right hand page appear the quantity, the price, the value of the goods sold, with the name of the buyer, and the mode and time of payment. When the total expenses of the transactions are taken from the total amount of the sales, the difference is called the net proceeds, which being on the left hand page makes it equal to the other on the right.

## BILLS OF EXCHANGE.

Exchange means the paying of a sum of money in one country or in one place of a country, for an equivalent sum in another country, or in another place of the same country. This is done by means of Bills of Exchange, which are written orders directing the payment of a certain sum of money at a fixed time. Bills of Exchange are either inland or foreign: the former are drawn and payable within one and the same state or country: but foreign bills are drawn in one country or state and payable in another. The period when a bill is due, or its term, varies according to the agreement between the parties concerned, or to the custom of the countries where it is drawn and made payable. Some are drawn at sight, that is, they must be paid as soon as presented: others are made payable at a certain distance of time, as a number of days or months after sight, or after the date of the bill: others again are drawn at usance, which is the customary term allowed, in different countries, for a bill being paid after it is dated or presented for payment. Double usance is twice this term, and half usance is half this term. Besides this usual term of payment, a certain time is also allowed after the time is expired, before payment can be enforced by law: and this additional time consists of a certain number of days of grace or favour, which in the British Isles is three: but bills drawn at sight are not entitled to any indulgence or days of grace.

It is of great importance that all inland bills of exchange or promissory notes be drawn on the proper stamps, and also without any alterations in the time, date, or names of the parties, as a neglect of either of these particulars will effectually invalidate them in the eye of the law, if it be found necessary to sue the parties for the amount. The following precedents will be found to suit all common occasions; and in drawing bills, care must be taken that the sum in writing agrees with that in figures, as much mischief has often arisen, even from the most trifling irregularities of this nature.

### *Inland Bills.*

£50 : 0 : 0. *Oxford, Jan.* 1, 1840.

At sight pay Mr. George Gregory, or order, fifty pounds, for value received.

Mr. Peter Thornton,
Merchant, London.

James Dawson.

£21 : 6 : 0. *Bristol, Jan.* 14, 1840.

Seven days after sight pay to the order of Mr. John Smith twenty-one pounds six shillings value received of Mr. John Grant.

Messrs. Thomas & Jones,
Milk Street, London. David Jones.

£500 : 0 : 0. *London, Jan.* 1, 1840.

Two months after date pay to my order five hundred pounds value received.

John Grimshaw, Esq.
Merchant, London. Joseph Greening.

*Foreign Bills.*

*London, Jan.* 16, 1840.

460 crowns, at 56½d. sterling per crown.

At usance pay this my first bill of exchange (second or third of the same tenor and date not paid) to Mr. Simon Morris, or order, four hundred and sixty crowns, at 56½d. per crown, for valued received of Mr James Adams, as per advice from

Mr. Samuel White, Merchant,
Amsterdam. Thomas White.

*Liverpool, Jan.* 24, 1840.

480 dollars, at 25¼d. per dollar.

At usance anda half pay this my first bill of exchange to Jonas Fox, Esq. or order, four hundred and eighty dollars, at 55¼d. per dollar, value received.

Mr. James Hortsman,
Merchant, Cadiz. Joseph Goodman.

*Note.* Usance between England, France, or Holland, is one calendar month; between England, Spain, or Portugal, two months; and between England and Italy, three months.

*Rules respecting Bills of Exchange.*

1. The accepter of any bill becomes absolute debtor to the person to whom it is payable, or to any subsequent holder, for its contents.

2. The drawer of any bill must give his correspondent a letter of advice that he has drawn such a bill, or such correspondent is under no obligation either to accept or pay it; and if the bill should be returned, although the party may have effects in his hands, yet all the expenses attending its return will fall on the drawer, for such neglect.

3. The holder of all bills of exchange must see that they are presented for payment on the day they become due, or all the parties through whose hands they have passed, except the accepter and drawer, will be completely exonerated from paying them. If the accepter die before they become due, they must be demanded of the executor or administrator.

4. All bills of exchange when paid must have a receipt on the back of them; the party receiving the money, if receiving it for his own use, need only write the word "received" and sign his name; if for another person or firm, "received for——" and also sign his name.

5. It frequently happens, that between the acceptance of a bill and the time of payment, the party to whom it is first made payable has occasion to pay it away: if so, he writes his name on the back of the bill, which is his order, and gives it to the person he is indebted to, and then he is empowered to receive the money: it may be, the second person also wants to pay it away, and then he likewise writes his name under the other, and delivers it to a third person to receive the money; and it may be, the third does the same, and delivers it to a fourth person, &c. All that do so are endorsers: and he that last has the bill, if the accepter will not pay it when due, may sue him, or the endorsers, or drawer, or any of them, for the money.

6. When a bill is dishonoured, the party that holds it may send it to the public notary, whose business it is: and he demands payment, and then, if required, draws up a protest according to law; which is to be returned to the drawer, within the time limited.

*Note.* The protest is not often used except in the case of foreign bills.

### *Promissory Notes.*

*London, Jan.* 1, 1840.

On demand, I promise to pay Solomon Greening, Esq. or order, one hundred pounds, value received, with lawful interest on the same.

£100 : 0 : 0. Joseph Brown.

£67 : 10 : 0. *Birmingham, Jan.* 1, 1840.

Three months after date we promise to pay Messrs. Grosvenor and Norris, or order, sixty-seven pounds ten shillings for value received.

At Messrs. Ladbroke and Co.'s. Saull and Saddington.
Bankers, London.

If a promissory note on demand be kept by the holder above three days, and the drawer of it should fail, the loss will fall on the holder; but if it be presented and returned within that time, the loss will fall on the person from whom it was received.

### *Forms of Receipts.*

When an apprentice or servant receives money for the use of his employer:—

Received, the 13th of January, 1840, of Mr. John Barnett, forty-eight pounds nine shillings and sixpence, for my master, Randell Norris.

£48 : 9 : 6. Samuel Summers.

Received, the 19th of January, 1840, of Mr. John Scott, nine pounds twelve shillings on account, for my father, Joseph Bakewell.

£9 : 12 : 0. Thomas Bakewell.

When masters and men of business receive money on their own account:—

Received, the 24th of February, 1840, of Messrs. Jones and Bell, fifty-five pounds five shillings on account.

£55 : 5 : 0. George Thompson.

Received, the 1st of March, 1840, of Mr. Jonathan Wright, sixty, pounds eighteen shillings, in full of all demands for self and partner.

£60 : 18 : 0. Thomas Dicks.

# CHAPTER VI.

## BIOGRAPHY

This species of composition consists of the lives of distinguished and eminent persons in every rank of life and every range of celebrity. In ancient times it appears that some kind of biography originated with bards and minstrels, and that the subjects of their pen were supplied by the wonderful exploits of their chiefs, to whom they ascribed superhuman abilities, and whom they magnified into demigods. These effusions of the poets were held by the chieftains in the highest veneration; not merely as the inspirations of genius, but as the still loftier conceptions of beings whose minds were under the peculiar impulse of superior power. If, however, we advert to the history of ancient Greece, whose illustrious sons eminently distinguished themselves in every department of scientific and literary acquisition, we shall find that it had almost passed the zenith of glory, before legitimate and sober biography obtained any eminent station in the department of its literature. The virtues of Socrates employed the exquisite taste of Xenophon, and the sublime genius of Plato; the philosophic sagacity, and the enthusiastic zeal, with which they have delineated the character of this extraordinary man, will engage the attention, and excite the admiration of succeeding ages. But it was about the beginning of the second century, that Plutarch, by the diligence of his investigation, placed this species of history in the conspicuous situation which it now occupies, and by combining entertainment and instruction with fidelity of representation, stamped the indelible marks of truth upon his interesting productions.

During the sixth and seventh centuries biography partook of that ignorance and darkness which marked all other branches of polite literature. The greater part of the monastic orders, the only class of persons whom the voice of an illiterate age had dignified with the character of learning, lavished their time in studying the fabulous legends of pretended saints, or in

composing histories equally fabulous. But since the revival of learning, biography has been considered as an accession to the stores of mental opulence, and has been consecrated to the development of the nature of man, the progress of intellect, and the conformation of character; instead of being employed to throw the mysterious veil of sanctity over the basest passions of human nature.

It has been observed, that in the history of empires and nations, the theatre is wide, the drama extended, the characters exceedingly diversified, and incidents almost inexplicably interwoven. History presents man to our remote view in patriarchal simplicity, and traces him from the wildest barbarism to the high-wrought specimen of cultivated life; but biography selects from the mass of human kind some eminent and distinguished individuals, that we may be gratified with the advantage of a nearer contemplation. General history exhibits the monarch on his throne, the statesman in his cabinet, the hero in the field, and describes no more of their principles and passions than is indispensably necessary to mark the connexion of events, and the illustration of public transactions; while biography introduces us to a closer inspection of those qualities which had a mysterious influence in stamping upon the character its individual peculiarity. Whilst the lapse of time is thickening the veil which is spread over remote persons and interesting events, biography steps forward to rescue what is memorable from sinking into total oblivion. It introduces the inquisitive mind into an intimate acquaintance with philanthropists, philosophers, and moralists, who have long since abandoned this orb; it leads us through a series of uniform and characteristic actions into a clear and full knowledge of those who were once either the destroyers, or the benefactors of mankind; and gently compels the mind to combine by its own operations all the detached instances of virtue in one bright assemblage. Biography exhibits principles in operation, and transports the imagination into the presence of the wisest and greatest of our progenitors, though separated from them by the intervention of ages and generations, of oceans and continents. Here we behold the transient distinctions of this world obliterated, mental and moral worth surviving the ruins of the tomb, and the brow of goodness crowned with laurels, which will outlive the verdure of the spring, and bloom for ever in perennial beauty. Another advantage resulting from biography is, that it enables us to form our opinions relative to the nature of man, by causing him to pass before us under all the various forms of human existence; hence individual representations are obviously superior to general and

aggregrate. The attention being confined to one particular object, the view is necessarily more distinct, and the impression upon the heart more forcible and durable. As there is an innocent and instructive curiosity in the human mind, prompting it to be inquisitive respecting the commencement of whatever has excited its attention, it is not presumptuous to expect, that a work professedly biographical should delineate the prominent features of the moral man, mark the progressive development of intellect, and trace the causes and influence which operated in the formation of character.

The perusal of biographical composition gives an unbounded scope to almost all the powers of the mind. The imagination presents the person, the place, and the incidental events before the eye; the understanding arranges and associates ideas, traces the operations of different circumstances in forming the peculiar complexion of the character, whilst the passions are excited in proportion to the excellency of the subject. If the subject of the narrative has distinguished himself by moral or religious attainments, it will impress a salutary influence upon the conscience, lead to self-reflection, occasion moral comparison, and act upon the mind as a stimulus to follow and resemble him in the essential determination of his character. On the other hand, if by his extraordinary endowments he has explored new regions of science, or reached to superior excellence in the fine arts, the contemplation of his character will give an immediate interest to the mind, kindle the flame of emulation, excite intense application, and call into exercise the sublimest energies of the human character. One of the principal ends of biography is, to make pleasing entertainment the vehicle of important information. The page of history is generally employed in relating the aggrandizement of kingdoms, the subversion of empires, the achievements of mighty conquerors, and the adjustment of treaties; which, however interesting to the sagacious politician, are deficient in entertainment, and capable of little or no application to ordinary life, where men excel each other only by prudence and virtue. Scenes of violence and blood, the workings of ambition, pride, and revenge, stain the historic page; but a faithful delineation of eminent personages, though it does not shine with so conspicuous a glare, diversifies the scene with milder colours and more beautiful shades.

Biographers lie under many disadvantages, and are liable to many mistakes. The authority upon which the principal part of their writings rests, is not always entitled to unlimited confidence. Their chief authorities are private testimonies and traditional reports; materials which, when accessible, are generally dispersed and confounded among the ruins of nature, and the rubbish of

fictitious representation, and cannot easily be distinguished and separated, even by the eye of discernment and the hand of honesty. To discriminate accurately those circumstances which may have influenced the character of a distinguished personage, forms one of those departments of philosophical investigation that can never become useless or uninteresting; but these circumstances are far from being universally obvious. The principal events of the life of an individual are often dependent on causes totally unknown to himself; and it is not impossible, but that a circumstance, so trivial as to escape his own attention, may produce a series of events, all of which contribute to form his character, and fix the part appointed him to perform in the great drama of human life. The biographer, therefore, can scarcely be expected to obtain that insight into the motions of the mind, which is so necessary to ascertain the causes that influenced the moral formation of the man. This unavoidable defect in biographical writings induced our great moralist to give the decided preference to the memoirs of which the subject is his own writer. The author here cannot deviate from the truth through ignorance or involuntary error, but a vast allowance must be made to the powerful operation of the principle of self-love, which presents a difficulty in regard to this species of writing for which ample allowance must be made.

Another difficulty in the way of a man's writing memoirs of himself is caused by the extreme deficiency of that self-observation which, to any extent, is no common employment either of youth or any later age. "Men," says Foster, "realize their existence in the surrounding objects that act upon them and form the interests of self, rather than in that very self—that inferior being, which is thus acted upon. So that this being itself, with its thoughts and fcelings, as distinct from the objects of those thoughts and feelings, but rarely occupies its own deep and patient attention. Men carry their minds as they carry their watches, content to be ignorant of the mechanism of their movements, and satisfied with attending to the little exterior circle of things, to which the passions, like indexes, are pointing. It is surprising to see how little self-knowledge a person not watchfully observant of himself may have gained in the whole course of an active, or even an inquisitive life. He may have lived almost an age, and traversed a continent, minutely examining its curiosities, and interpreting the half-obliterated characters on its monuments, unconcious the while of a process operating on his own mind to impress or to erase characteristics of much more importance to him than all the figured brass or marble that Europe contains. After having explored many a cavern or dark ruinous avenue, he may have left undetected a darker recess in his character. He

may have conversed with many people, in different languages, on numberless subjects; but, having neglected those conversations with himself by which his whole moral being should have been kept continually disclosed to his view, he is better qualified, perhaps, to describe the intrigues of a foreign court, or the progress of a foreign trade; to represent the manners of the Italians, or the Turks; to narrate the proceedings of the Jesuits, or the adventures of the gypsies; than to write the history of his own mind." Notwithstanding these difficulties, there are many advantages attending an autobiography, and accordingly some of the most interesting portions of our literature have been found among this species of composition.

A late biographer observes, "that the writer of his own life has at least the first qualification of an historian—the knowledge of the truth; and though it may be plausibly objected that his temptations to disguise it are equal to his opportunities of knowing it, yet we cannot but think that impartiality may be expected with equal confidence from him that relates the passage of his own life, as from him that delivers the transactions of another. He who sits down calmly and voluntarily to review his life for the admonition of posterity, or to amuse himself, and leaves this account unpublished, may be commonly pronounced to tell the truth, since falsehood cannot appease his own mind and fame will not be heard beneath the tomb."

We now proceed to introduce a few examples of this species of writing, and they shall be selected from among different classes of character. Our object will be rather to give a number of slight biographical sketches, illustrative of certain castes and dispositions of mind, than laboured histories of a few individuals. Our examples shall be distributed under the following heads: I. Eminent Statesmen, Philosophers, and Men of Science. II. Naval and Military Men. III. Poets and Literary Characters. IV. Christian Divines, Philanthropists, &c. The two first of these classes will introduce us chiefly to individuals shining in public life; the two latter will invite us to contemplate the character of private individuals, whose claim to publicity is derived chiefly from their talents or their virtues.

## Section I.—Statesmen, Philosophers, and Men of Science.

### DR. FRANKLIN

Benjamin Franklin, the celebrated philosopher and statesman, was a remarkable instance of a man's rising to eminence from a

low station in life, merely in consequence of the ardent pursuit of knowledge. He was born in the year 1706, at Boston, in America. His ancestors resided for many generations in Northamptonshire, England; but the persecution of the non-conformists in the reign of Charles II. induced his father to take refuge in New England, where he followed the trade of a tallow-chandler. Franklin very early discovered a propensity towards literary pursuits, which determined his father to qualify him for the ministry; but his design was frustrated by an increasing family, and Benjamin was taken from school at ten years of age, to help in the drudgery of his father's trade. This greatly mortified the aspiring mind of young Franklin, who preferred a seafaring life; but was prevailed on by the persuasions of his father to relinquish this plan, on account of its ill effects on his morals. He had access to very few books; but among these was Defoe upon Projects, which made such impressions on his mind, as in a great measure directed the pursuits of his after life. He was at length placed with his brother who had a printing-office in Boston, and was bound apprentice to him at twelve years of age. With the mechanical part of the business he was soon acquainted; and the opportunities afforded him of procuring new books to read, were eagerly seized, and the greater part of the night frequently spent in the perusal of them. He soon became anxious to imitate the works which he most admired, and his first attempts at composition consisted of ballads. His father, however, succeeded in convincing him that he was not formed to excel as a poet. He therefore turned his attention to prose composition, in which he succeeded admirably. With a passion for reading and writing, he imbibed a kindred one for disputation, and adopting the Socratic method, he became dexterous in confuting and confounding an antagonist by a series of questions.

He had an intimate acquaintance of the name of Collins, who was, like himself, passionately fond of books, and with whom he was in the habit of arguing upon such subjects as they met with in the course of their reading. Among other questions which they discussed in this way, one accidentally arose on the abilities of women, and the propriety of giving them a learned education. Collins maintained their natural unfitness for any of the severer studies, while Franklin took the contrary side of the question—"perhaps," he says, "a little for dispute sake." His antagonist had always the greater plenty of words, but Franklin thought that, on this occasion in particular, his own arguments were rather the stronger; and, on their parting without settling the point, he sat down, and put a summary of what he advanced in writing,

which he copied out and sent to Collins. This gave a new form to the discussion, which was now carried on for some time by letters, of which three or four had been written on both sides, when the correspondence fell into the hands of Franklin's father. His natural acuteness and good sense enabled him here again to render an essential service to his son, by pointing out to him how far he fell short of his antagonist in elegance of expression, in method, and in perspicuity, though he had the advantage of him in correct spelling and punctuation, which he evidently owed to his experience in the printing-office. From that moment Franklin determined to spare no pains in endeavouring to improve his style; and we shall give, in his own words, the method he pursued for that end.

"About this time," says he, in the autobiography of his early life, "I met with an odd volume of the Spectator: I had never before seen any of them. I bought it, read it over and over, and was much delighted with it. I thought the writing excellent; and wished, if possible, to imitate it. With that view, I took some of the papers, and making short hints of the sentiments in each sentence, laid them by a few days; and then, without looking at the book, tried to complete the papers again, by expressing each hinted sentiment at length, and as fully as it had been expressed before, in any suitable words that should occur to me. Then I compared my Spectator with the original, discovered some of my faults, and corrected them. But I found I wanted a stock of words, or a readiness in recollecting and using them, which I thought I should have acquired before that time if I had gone on making verses; since the continual search for words of the same import, but of different length, to suit the measure, or of different sound for the rhyme, would have laid me under a constant necessity of searching for variety, and also have tended to fix that variety in my mind, and make me master of it. Therefore, I took some of the tales in the Spectator, and turned them into verse; and, after a time, when I had pretty well forgotten the prose, turned them back again. I also sometimes jumbled my collection of hints into confusion; and, after some weeks, endeavoured to reduce them into the best order, before I began to form the full sentences and complete the subject. This was to teach me method in the arrangement of the thoughts. By comparing my work with the original, I discovered many faults. and corrected them; but I sometimes had the pleasure to fancy that, in certain particulars of small consequence, I had been fortunate enough to improve the method of the language; and this encouraged me to think that I might, in time, come to be a tolerable English writer, of which I was extremely ambitious."

Even at this early age nothing could exceed the perseverance and self-denial which Franklin displayed, in pursuing his favourite object of cultivating his mental faculties to the utmost of his power. When only sixteen, he chanced to meet with a book in recommendation of a vegetable diet, one of the arguments at least in favour of which made an immediate impression upon him—namely, its greater cheapness; and from this and other considerations, he determined to adopt that way of living for the future. Having taken his resolution, he proposed to his brother, if he would give him weekly only half what his board had hitherto cost, to board himself,—an offer which was immediately accepted. He presently found that, by adhering to his new system of diet, he could still save half what his brother allowed him.

A few years before this his brother had begun to publish a newspaper, the second that had appeared in America. Benjamin sent a number of pieces, on various topics, to be inserted, which met with the approbation of the most competent judges. His brother, however, always treated him with the harshness of a master, till at length the States of America having prohibited James Franklin from publishing his paper, on account of some political offence, the name of Benjamin was employed as publisher, in consequence of which he procured his indentures.

He now resolved to make his way to New York, the nearest place where there was a printer; and accordingly, after selling his books to raise a little money, he embarked on board a vessel for that city, without communicating his intention to his friends, who he knew would oppose it. In three days he found himself at the end of his voyage, near three hundred miles from his home, at the age of seventeen, without the least recommendation, as he tells us, or knowledge of any person in the place, and with very little money in his pocket. Worst of all, upon applying to the only printer likely to give him any employment, he found that this person had nothing for him to do, and that the only way in which he could serve him was by recommending him to proceed to Philadelphia, a hundred miles further, where he had a son, who, he believed, might employ him.

The following is his own most graphic description of his first appearance in Philadelphia. After concluding the account of his voyage along the coast, "I have been the more particular," says he, "in this description, and shall be so of my first entry into that city, that you may, in your mind, compare such unlikely beginnings with the figure I have since made there. I was in my working dress, my best clothes coming round by sea. I was

dirty, from my being so long in the boat; my pockets were stuffed out with shirts and stockings; and I knew no one, nor where to look for lodgings. Fatigued with walking, rowing, and the want of sleep, I was very hungry; and my whole stock of cash consisted in a single dollar, and about a shilling in copper coin, which I gave to the boatmen for my passage. At first they refused it, on account of my having rowed; but I insisted on their taking it. Man is sometimes more generous when he has little money than when he has plenty, perhaps to prevent his being thought to have but little. I walked towards the top of the street, gazing about till near Market-street, where I met a boy with bread. I had often made a meal of dry bread, and inquired where he had bought it. I went immediately to the baker's he directed me to. I asked for biscuits, meaning such as we had at Boston; that sort, it seems, was not made in Philadelphia. I then asked for a three-penny loaf, and was told they had none. Not knowing the different prices, nor the names of the different sorts of bread, I told him to give me three pennyworth of any sort. He gave me, accordingly, three great puffy rolls. I was surprised at the quantity, but took it; and having no room in my pockets, walked off with a roll under each arm, and eating the other. Thus I went up Market-street, as far as Fourth-street, passing by the door of Mr. Read, my future wife's father, when she, standing at the door, saw me, and thought I made, as I certainly did, a most awkward, ridiculous appearance. Then I turned and went down Chesnut-street, and part of Walnut-street, eating my roll all the way, and coming round, found myself again at Market-street wharf, near the boat I came in, to which I went for a draught of the river water; and being filled with one of my rolls, gave the other two to a woman and her child that came down the river in the boat with us, and were waiting to go farther. Thus refreshed, I walked again up the street, which, by this time had many clean-dressed people in it, who were all walking the same way. I joined them, and thereby was led into the great meeting-house of the Quakers, near the market. I sat down among them; and after looking round awhile, and hearing nothing said, being very drowsy, through labour and want of rest the preceding night, I fell fast asleep, and continued so till the meeting broke up, when some one was kind enough to rouse me. This, therefore, was the first house I was in, or slept in, in Philadelphia."

Here he procured work with a printer of the name of Keimer. He had been some months at Philadelphia, his relations in Boston knowing nothing of what had become of him, when his brother-in-law, who was the master of a trading sloop, happening to hear of

him in one of his voyages, wrote to him in very earnest terms, to entreat him to return home. The letter which he sent in reply to this application reached his brother-in-law when he chanced to be in company with Sir William Keith, the governor of the province; it was shown to that gentleman, who expressed considerable surprise on being told the age of the writer; and immediately said that he appeared to be a young man of promising parts, and that if he would set up on his own account in Philadelphia, where the printers were wretched ones, he had no doubt he would succeed: for his part, he would procure him the public business, and do him every service in his power.

Encouraged by this gentleman to adopt such a plan, he set out for Boston on a visit to his parents, in order to procure from them some pecuniary aid; but a welcome reception was all he could obtain. Having returned to Philadelphia, Sir William offered to take the whole burden upon himself, and advised Franklin to make a voyage to England, in order to procure every thing necessary for a printing-office. He set sail in the year 1725; but soon discovered that Sir William Keith, on whose letters of recommendation and credit he entirely relied, had deceived him, and he was obliged to obtain work as a journeyman in London for his immediate subsistence. While in this situation Franklin acquired considerable reputation by a Dissertation on Liberty and Necessity, Pleasure and Pain; and it was the means of introducing him to the celebrated Dr. Mandeville, author of the fable of the Bees.

After eighteen months' residence in London, he returned to Philadelphia in the year 1726, and became clerk to a merchant. He was afterwards employed as overseer in the office of Keimer, his former master. Here he acquired great esteem; and at length conceived the idea of setting up for himself, which he accomplished, by entering into a partnership with one of his companions named Mereditch, whose father was in circumstances to advance the money required. Franklin and his partner began to publish a newspaper, which the labours and talents of the former brought into repute, and they obtained the printing of the Votes and Laws of the Assembly. The partnership being dissolved by the departure of Mereditch, Franklin, by the aid of friends, was enabled to take the whole business upon himself, to which he added the business of a stationer. When the new emission of paper-money engaged the attention of the American government, Franklin wrote an anonymous pamphlet in defence of the measure, by which he acquired considerable favour among men in power. In September 1736, he married a lady to whom he had paid his addresses before his visit to England.

The public library at Philadelphia was established in 1731, chiefly by Franklin's exertions, and he had the satisfaction to see it attain to a very flourishing condition. His well-known work, called "Poor Richard's Almanack," was begun in 1732, and became remarkable for the prudential maxims with which it abounded. Franklin's political career commenced in 1736, when he was chosen clerk to the general assembly of Pennsylvania, to which he was re-elected for several years, and at last became a representative. In 1737 he was made postmaster of Philadelphia, and in a subsequent year he greatly improved the police of the city, by the formation of a fire company, and afterwards of an insurance company. In the war with France, which broke out in 1744, Franklin suggested the idea of a voluntary association for defence, which was instantly joined by 1200 persons.

About this period he began his interesting experiments on electricity, by the result of which he acquired so distinguished a reputation. The library society of Philadelphia having received from Mr. Peter Collinson, in the year 1745, an account of the facts respecting electricity which at that time engrossed the attention of philosophers in Europe, Franklin applied himself to the subject with great assiduity, and in a short time he made many valuable and highly important discoveries, an account of which he published in three pieces, entitled "New Experiments and Observations in Electricity, made at Philadelphia in America." The most brilliant of his discoveries was that which proved the identity of the electric fluid and lightning. Their similarity had been suspected by Abbé Nollet, and some experiments had begun to be made in France towards the verification of the fact, but Franklin completed the proof of it entirely by his own experiments; and he afterwards applied his discovery to the securing of buildings from the effects of lightning. See *Electricity*, Chap. XI. Sect. 8.

The lightning-rod was the result of some of the amusing experiments with which Franklin was, at the commencement of his electrical investigations, accustomed to employ his own leisure, and afford pleasure to his friends. In one of his letters to Mr. Collinson, dated so early as 1748, he expresses himself in the following strain, in reference to his electrical experiments. "Chagrined a little that we have hitherto been able to produce nothing in this way of use to mankind, and the hot weather coming on, when electrical experiments are not so agreeable, it is proposed to put an end to them for this season somewhat humorously, in a party of pleasure on the banks of Skuylhill. Spirits at the same time are to be fired by a spark sent from side to side through the river, without any other conductor than the water, an experiment

which we have some time since performed to the amazement of many. A turkey is to be killed for dinner by the electrical shock, and roasted by the electrical jack, before a fire kindled by the electrified bottle; when the healths of the famous electricians in England, Holland, France, and Germany, are to be drunk in electrified bumpers, under the discharge of guns from the electrical battery."

Franklin's electrical discoveries did not, on their first announcement, attract much attention in England; and, indeed, he had the mortification of learning that his paper on the similarity of lightning to electricity, when read by a friend to the Royal Society, had been only laughed at by that learned body. In France, however, the account that had been published in London of his experiments, fortunately fell into the hands of the celebrated naturalist, Buffon, who was so much struck with it, that he had it translated into French, and printed at Paris. This made it immediately known to all Europe; and versions of it in various other modern languages soon appeared, as well as one in Latin. In England, too, the Franklinian experiments gradually began to be spoken of; and, at last, even the Royal Society was induced to resume the consideration of the papers that had formerly been read to them. One of their members verified the experiment of bringing down lightning from the clouds; and upon his reading to them an account of his success, "they soon," says Franklin, "made me more than amends for the slight with which they had before treated me. Without my having made an application for that honour, they chose me a member; and voted that I should be excused the customary payments, which would have amounted to twenty-five guineas, and ever since have given me their Transactions gratis. They also presented me with the gold medal of Sir Godfrey Copley, for the year 1753, the delivery of which was accompanied with a very handsome speech from the president, Lord Macclesfield, wherein I was highly honoured." Some years afterwards, when he was in this country with his son, the university of St. Andrews conferred upon him the degree of Doctor of Laws; and its example was followed by the universities of Edinburgh and Oxford. He was also elected a member of many of the learned societies throughout Europe.

In pursuing the remainder of Franklin's history, we find the fame of the patriot vieing with that of the philosopher, in casting a splendour over it; and the originally poor and unknown tradesman standing before kings, associating as an equal with the most eminent statesmen of his time, and arranging along with them the wars and treaties of mighty nations. In 1747 he had been chosen

a representative of the city of Philadelphia for the provincial assembly. At this time a contest subsisted between the assembly and the proprietaries, as to the claim of the latter to be exempted from public burdens. Franklin took the popular side of the question, by which he acquired great influence, and was regarded as the head of the opposition. In 1757 he set sail for London as agent for Pennsylvania, the assembly of that province being involed in disputes with the proprietary. It was agreed on by the privy council that landholders should pay their share of the public burdens, on condition Franklin would engage that they should be fairly proportioned. He continued at the British court as agent for his province, and acquired so great a reputation, that the same trust was reposed in him for Massachusets, Maryland, and Georgia. In the year 1762 he returned to America, where he received the thanks of the assembly of Pennsylvania, and a handsome recompense for his important services. When the Stamp Act occasioned so much disturbance in America, he was summoned to the bar of the House of Commons, to give evidence respecting the disposition of the people, whether he thought they could be induced to submit to it; and the energy and clearness of his representations were instrumental in procuring the repeal of that obnoxious measure.

On the commencement of hostilities between Great Britain and the colonies, in 1775, Dr. Franklin returned to America, and was chosen a delegate to congress by the legislature of Pennsylvania. When the question of independence came to be discussed, he was decidedly in favour of the measure, and was instrumental in bringing over the public mind to the same opinon. When a negotiation with France was opened, he was chosen one of the personages to reside at that court; and he effected a treaty with France of an offensive and defensive nature, in 1778, the immediate consequence of which was a war with Britain. He was recalled from that active station in 1785, which he had filled with so much ability, and chosen president of the supreme executive council. His increasing infirmities obliged him, however, to withdraw from all public business in 1788; and on April 17, 1790, he terminated his active and useful life, in the eighty-fifth year of his age.

No philosopher of his age stood on a prouder eminence than this extraordinary man, who had originally been one of the most obscure of the people, and had raised himself to all this distinction almost without the aid of any education but such as he had given himself. "Who will say, after reading his story," it is justly remarked, "that any thing more is necessary for the attainment of

knowledge than the determination to attain it?—that there is any other obstacle to even the highest degree of intellectual advancement which may not be overcome, except a man's own listlessness or indolence? The secret of this man's success in the cultivation of his mental powers was, that he was ever awake and active in that business; that he suffered no opportunity of forwarding it to escape him unimproved; that, however poor, he found at least a few pence, were it even by diminishing his scanty meals, to pay for the loan of the books he could not buy; that, however hard-wrought, he found a few hours in the week, were it by sitting up half the night after toiling all the day, to read and study them. Others may not have his original powers of mind: but his industry, his perseverance, his self-command, are for the imitation of all; and though few may look forward to the rare fortune of achieving discoveries like his, all may derive both instruction and encouragement from his example. They who may never overtake the light, may at least follow its path, and guide their footsteps by its illumination."—*Pursuit of Knowledge*, Chap. XV.

## THE RIGHT HON. GEORGE CANNING.

This distinguished statesman was born in London, April 11, 1770. The family of Canning was originally of Foxcote in Warwickshire. George, fourth son of Richard Canning of Foxcote, emigrated to Ireland at the commencement of the seventeenth century. His great grandson of the same name, marrying a daughter of Robert Stratford, Esq. of Baltinglass, (an aunt of the first earl of Aldborough,) had a son named Stratford, after his maternal ancestors, who was the father of three sons, George, Paul, and Stratford: of these, the eldest gave birth to the deceased statesman; the second to George, now Lord Garvagh, (for whom his cousin procured that Irish barony in 1818;) and the third to a numerous family, including the Right Hon. Stratford Canning, late ambassador extraordinary and plenipotentiary at St. Petersburg, and afterwards at Constantinople.

His father dying when he was but a year old, the education of the future premier was superintended by his uncle, a merchant in London, principally engaged in the wine trade; but its expenses were sufficiently provided by a small estate in Ireland, which, though inadequate as a provision for life, was amply sufficient as a fund for education. His rudimental instruction Mr. Canning acquired at Hyde Abbey School, near Winchester, under the care of the Rev. Charles Richards. Even then his early compositions were distinguished by an extraordinary vigour of mind. At a

public exhibition he recited a prize poem on West's picture of the Resurrection of Lazarus—the altar-piece of Winchester cathedral. At another exhibition he displayed a promise of those powers which were destined hereafter to command the admiration of the world. Previous to a vacation, a selection from the Orestes of Euripides was enacted, when young Canning surpassed all his associates, by the judgment, sensibility, and elegance, with which he portrayed the madness of the conscience-stricken matricide. On another occasion he gave a spontaneous evidence of his extraordinary tenaciousness of memory, in reciting, by way of exercise, the whole of the English poems of Gray. Through life Mr. Canning cherished the greatest respect for his early preceptor, Mr. Richards; to whom he frequently evinced his grateful remembrance, particularly by transmitting his printed speeches to Hyde Abbey.

Having risen to the first class in this preparatory establishment, he was removed to Eton, and was instantly noticed as a boy of surprising genius and attainments. Ambitious of literary distinction, he had the address to infuse the same spirit into some of his compeers. The result was very extraordinary; being no less than an imitation of Addison, and the constellation of wits who, at the beginning of the century, produced the "Spectator." Mr. Canning was but just turned fifteen, when he laid the plan of a periodical paper, called "The Microcosm." It was published in weekly numbers, from November 6th, 1786, to July 30th, 1787, and was conducted by an association of four boys, who contributed to it under the signatures of A. B. C. and D. The papers signed A. were furnished by Mr. John Smith, the late paymaster of the navy; those signed B. were written by Mr. Canning; C. was the signature of Mr. Robert Smith, late member for Lincoln; and D. of Mr. John Hookham Frere, the late ambassador at Madrid. Lord Henry Spencer, (second son of the late Duke of Marlborough,) Mr. Joseph Mellish, Mr. Benjamin Wray, Mr. Capel Lofft, and Mr. Littlehalls, were also contributors. The contributions of Mr. Canning were eleven in number. One was a poem, and, considering his age, a very wonderful one, on "The Slavery of Greece;" the rest were principally of a humorous cast; and among them a burlesque piece of criticism on the childish ballad of "The Queen of Hearts," possesses uncommon merit. Of this very clever publication Mr. Canning was also the editor, and as such disposed of the copyright to the publisher.

For several years a society had periodically met in a hall at Eton, for the purpose of discussion. In this miniature senate

the crown and the people had their respective champions; the advocates were as solemn, as eager for victory, and as active in obtaining it, as the more mature debaters of the parliament itself. Mr. (now Marquis) Wellesley, Mr. (now Earl) Grey, and, at a subsequent period, Mr. Canning, distinguished themselves in this intellectual warfare. During Mr. Canning's career at Eton, he was eminently distinguished, as well as the present Marquis Wellesley, for his classical attainments; and the names of both these remarkable men are affixed to some of the most splendid compositions of the "Musæ Etonenses." George Canning was also distinguished in the school for the more than usual juvenile attachment which he evinced for the principles of social liberty; and there are persons still living who well remember the passionate interest which the youthful enthusiast took in the contest for the representation of Windsor, which the celebrated Admiral Keppel carried on against the court candidate.

During his whole life Mr. Canning delighted in his recollection of Eton; and assiduously kept up his connexion with that celebrated school. His visits to the Montem were constant. At the Montem of 1823, he accidentally met Mr. (now Lord) Brougham, for the first time in public, after their escapade in the House of Commons. The hand of the generous secretary was immediately stretched out to his opponent, in the presence of a thousand admiring spectators. On the 4th of June of the following summer, Mr. Canning was the sitter in the "ten-oar," at the Eton regatta, a post of honour which is always reserved by the boys for some favoured visitor. He huzzaed again and again with the loudest of them, as they passed the crowded shores; and Eton felt proud of her scholar and her statesman.

Having attained the highest post of honour, or, in academic phrase, become captain of the school of Eton, Mr. Canning, in October, 1787, was matriculated at Oxford, as a student of Christ-church; where he found himself in the midst of his Westminster antagonists, but without exciting any other sentiment than admiration of his talents, and esteem for his virtues. Here also, as in former instances, the ripeness of his genius quickly appeared, and drew upon him the notice of the university. While yet, in the language of the schools, a freshman, and not out of his teens, he had the boldness to stand as a competitor for the chancellor's first prize, and succeeded. This was a Latin poem, on the following subject: "Iter ad Meccam Religionis Causa Susceptum;" and the purity and spirit of the composition gained great applause.

It was while at Oxford that Mr. Canning's friendship com-

menced with the Hon. Robert Banks Jenkinson, now earl of Liverpool, who was only of a few months older standing than Mr. Canning, having received his previous education at the Charter-house. They, (with Lord Henry Spencer, who had entered Christ Church at the same time,) were constantly in each other's society; and there acquired that mutual regard, which no occasional political difference at any time seriously interrupted. It was also to Mr. Jenkinson, though not entirely, that Mr. Canning was indebted for his introduction to Mr. Pitt. When, with that design, Mr. Canning was invited to dinner with the first earl, at Addiscombe-house, it was found, to the surprise and amazement of their host, that the two supposed stranger guests were already acquainted with each other; for Mr. Pitt, (through what channel is not exactly known,) had some time before intimated to Mr. Canning his wish to become acquainted with him, and they had met without the intervention of any third person.

Mr. Sheridan was at that time in the full blaze of his meteoric prosperity; and in consequence of his connexion with Mr. Canning's family, it was Mr. Canning's good fortune to spend all his vacations with that wit. To Sheridan Mr. Canning was indebted for an introduction to some of the most distinguished men of the day; among others to Edmund Burke, whose prophetic acumen did not fail him in his auguries of Mr. Canning's success as a parliamentary orator. To Sheridan Mr. Canning was also indebted for gaining admittance, whilst still a youth, to the society of Devonshire-house. He was introduced to the Duchess at a splendid supper, given by her Grace to Mr. Fox, Lord John Townshend, Lord Robert Spencer, Mr. Richardson, Gen. Fitzpatrick, Gen. Burgoyne, Mr. Tickell, and other celebrated wits of the day. On his first interview, Canning displayed a brilliancy and talents beyond his age.

After taking his first degree at Oxford, Mr. Canning entered himself at Lincoln's Inn, with the view of pursuing the profession of the law. From that intention, however, he was diverted by the advice of Sheridan, who had repeatedly witnessed his oratorical powers at one of the debating societies which at that time existed in the metropolis. Mr. Canning entered parliament in 1793. "From the political faith," says Mr. Moore, in his life of Sheridan, "in which he had been educated, under the very eye of Mr. Sheridan, who had long been the friend of his family, and at whose house he generally passed his college vacations, the line that he was to take in the House of Commons already, according to the usual course of events, was marked out for him. But his decision was in favour of the Minister and toryism; and after a

friendly and candid explanation to Mr. Sheridan, of the reasons and feelings that urged him to this step, he entered into terms with Mr. Pitt, and was by him immediately brought into parliament." Sir Richard Worsley having retired, purposely to make room for him, Mr. Canning took his seat as member for the borough of Newport, in the Isle of Wight.

He soon began to distinguish himself in parliament; and in May 1794, in the debate on the third reading of the Habeas Corpus Suspension Bill, replied with much spirit to Mr. Gray, (the present Lord Grey,) who had accused Mr. Pitt of duplicity and apostasy; and defended the measure as indispensably required by the imminent danger of the time. Mr. Canning took the degree of M.A. on the 5th of July, 1794. Until that period he had been a frequent resident at Christ-Church. He now, however, discontinued that practice, and made the metropolis his constant abode. Mr. Fox having in the next session of parliament moved for a committee on the state of the nation, the motion was warmly opposed by Mr. Canning, who characterised the proposition as being, in some points of view, useless, in others, impolitic, and in none, as possessing any claim to the sanction of the house.

In 1796 Mr. Canning accepted of Mr. Pitt the post of under-secretary of state; and at the general election in that year, he was returned for the treasury borough of Wendover. At the same period he was appointed receiver-general of the Alienation Office. In the autumn of 1797, Mr. Canning, in conjunction with Mr. Jenkinson, (the late earl of Liverpool,) Mr. George Ellis, (the present Lord Seaford,) Mr. Freere, and other of his friends, projected "The Anti-Jacobin, or Weekly Examiner;" the object of which was, by the twofold operation of argument and ridicule, to attack the numerous journals which in that perilous time were advocating the cause of equality and republicanism, The prospectus of this work was written by Mr. Canning. Mr. William Gifford having been appointed the editor, the first number appeared on the 20th of November, 1797; and the publication was regularly continued until the 9th of July, 1798. In the session of 1798, Mr. Wilberforce having moved for leave to bring in a bill for the abolition of the slave-trade, the motion was supported by Mr. Canning, in a speech of great feeling and ability. Mr. Canning was, in March, 1799, appointed one of the commissioners for managing the affairs of India. On the 8th of July, 1800, he increased his fortune and interest by a marriage with Joanna, the youngest daughter of General John Scott, of Balconie. The fortune of this lady exceeded £100,000. Early

in the year 1801, the administration, which had so long defied the efforts of an able and indefatigable party, was suddenly dissolved. Mr. Canning, of course, resigned his official situations. The following year he was returned member for the borough of Tralee. He now appeared on the opposition side of the house, and assailed the administration of Mr. Addington with such force of argument and keenness of irony, as greatly to provoke the zealous partisans of that gentleman.

From this time nothing remarkable occurred in Mr. Canning's personal or public history, until the death of Mr. Pitt, in January, 1806. At the funeral of that illustrious statesman, Mr. Canning attended as a sincere mourner; and with Mr. George Rose, and Mr. Spencer Perceval, bore the banners of emblems. Many years after this melancholy event, Mr. Canning, in a public speech at Liverpool, said, with great emphasis, "In the grave of Mr. Pitt my political allegiance lies buried." Mr. Canning was now returned member for Sligo; and, being again in opposition, had to contend with some of his former associates; and, indeed, to stand almost alone against what he ironically termed "all the talents, all the wisdom, and all the experience of a combined host of Whigs and Tories, Foxites and Pittites."

The year 1809 was an eventful period in Mr. Canning's life. It had long been rumoured that considerable differences existed among some of the members of the cabinet, and in fact was ascertained in a singular manner, when, on the 21st of September, 1809, Mr. Canning met Lord Castlereagh upon Putney Heath, to settle their dissensions by a duel. Lord Castlereagh gave the challenge, and was attended by the present Marquis of Hertford, Mr. Canning, by Mr. Ellis (now Lord Seaford). After taking their ground, they fired, and missed; no explanation taking place, they fired a second time, when Mr. Canning received his adversary's ball in his thigh. He did not fall from the wound, nor was it known by the seconds that he was wounded, and both parties stood ready to give or receive further satisfaction, when Mr. Ellis, perceiving blood on Mr. Canning, the seconds interfered. Mr. Canning was conveyed to his house, Gloucester Lodge, at Brompton, where he was for some time confined; but the bone of the thigh was not fractured, and Mr. Hone, who was in attendance, dressed the wound, which was soon after perfectly healed. This quarrel immediately excited a considerable sensation among the friends of both parties at the time. It was understood that his late Majesty expressed his strong, and certainly just disapprobation of the practice of settling ministerial disputes by sword or pistol; and the Duke of Portland, as well as Mr. Canning and Lord

Castlereagh, resigned his official station. But although Mr. Canning no longer formed a part of his Majesty's government, he continued actively to discharge his duties as a member of the House of Commons.

Immediately on the assassination of Mr. Perceval (11th of May, 1812), the remaining ministers were, of course, anxiously employed in considering how they might best supply the loss of their distinguished chief and leader. Lord Liverpool was, in the first instance, authorized by the Prince Regent to apply to the Marquis Wellesley and Mr. Canning. His lordship's overtures were, however, declined. The marquis of Wellesley was afterwards empowered by the Prince Regent to form an administration, of which Mr. Canning was to be a member; but the noble marquis failed to accomplish his object; nor was another attempt by Earl Moira more successful. Parliament having been dissolved, Mr. Canning offered himself as a candidate for the representation of Liverpool, and was every time elected, but never without strong opposition.

In October 1814, Mr. Canning was appointed Ambassador Extraordinary and Plenipotentiary to the Prince Regent of Portugal. He accordingly repaired to Lisbon, where he resided until the downfal of Buonaparte at Waterloo. After that event Mr. Canning resigned his situation, and went to the south of France, for the health of some of his family, which was, in fact, the real motive for his going abroad at all. There he remained until the middle of the summer of 1816, when he returned to England, and, on the death of the earl of Buckingham, he was appointed President of the Board of Control. Early in the Spring of 1820 Mr. Canning lost his son, Mr. George Charles Canning, in the 19th year of his age, who had for a considerable time been in a declining state. This was a severe stroke to the father, who recorded his sense of the calamity in some pathetic lines inscribed on an elegant monument in the new burying ground at Kensington.

When the message relative to the late queen Caroline was presented to the house, on the 7th of June, 1820, Mr. Canning, while he denied that the inquiry into her Majesty's conduct had been forced on by ministers, who, on the contrary, had done every thing in their power to avert it, allowed that much mischief must be the result. "Towards the illustrious personage who is the object of this investigation," observed Mr. Canning, "I feel an unaltered regard and affection. If there had been any injustice meditated towards her, no consideration on earth should have induced me to be a party to it, or to stand where I now stand.

It is but due to those with whom I act, to say, that all that has been done by government with respect to her Majesty, has been done in the spirit of honour, candour, justice, and feeling Having discharged my duty in making these observations, I hope I may, without any dereliction of it, indulge my private feelings, by abstaining as much as possible from taking any part in the future stages of these proceedings." Soon after, Mr. Canning resigned the Presidency of the Board of Control, and went abroad for a few weeks.

On the recall of the marquis of Hastings from India, Mr. Canning was nominated Governor-general. He accordingly made all his arrangements for leaving the country, and went down to Liverpool to take leave of his friends and constituents in that town. While Mr. Canning was on this valedictory visit, the Marquis of Londonderry put an end to his own existence on the 12th of August, 1822, which gave a new turn to public affairs in England.

On the 16th of September, 1822, Mr. Canning was appointed Secretary of State for Foreign Affairs. He continued to hold this office during the administration of Lord Liverpool till the year 1827, when in the month of February the premier was suddenly attacked with a paralytic stroke, the permanent consequences of which were of such a nature as to remove the minister for ever from public life. The office of premier was thus unoccupied; the government was left without a head; and, unfortunately, the difficulties of appointing a successor, which were never small, were greatly increased by the very nature of the cabinet over which Lord Liverpool had presided. For some years, it had not been characterised by perfect unanimity of sentiment on more than one of the most important public questions. Catholic emancipation was a known and acknowledged source of difference of opinion amongst its members. It was the influence of Lord Liverpool alone, which had kept these discordant materials together, and by his removal from office, these differences were freed from the weight which had hitherto compressed and restrained them. The men who had acted in willing subordination to Lord Liverpool, were by no means equally inclined to yield to each other.

His Majesty, however, after some deliberation, had finally determined that the new ministry should be, like its predecessor, divided in opinion on the catholic question, but that Mr. Canning, the leader of the Catholic party, who refused to serve under an anti-catholic premier, should be at its head. Mr. Canning proceeded to make his arrangements, and after some delay succeeded in forming an administration, but it was of short duration. The

health of Mr. Canning had been in a very delicate state even at the commencement of the session, and the mental anxiety which followed was but little favourable to its restoration. Mr. Canning, too, was a man of kindly and amiable feelings; and the rupture of old intimacies, and the necessity of conciliating old enemies, where no cordial confidence could ever be reposed, brought with it an irritation and disappointment a thousand times more annoying and exhausting, than, to such a head, the mere anxieties of government could ever have become. His care-worn appearance betrayed that the mind was ill at ease within: mind and body panted equally for repose. Soon after the rising of parliament he was visited by an attack of illness, which seemed, however, to yield to medical treatment, and he went to the duke of Devonshire's seat at Chiswick, to seek tranquillity and enjoy a purer air. The disease returned, inflammation had commenced; it proceeded with a violence and rapidity which set art at defiance. Mr. Canning expired at Chiswick (the same house in which Mr. Fox had breathed his last) on the morning of the 8th of August, after having been prime minister for only four months.

In Mr. Canning's death Europe lost the ablest statesman, and the Commons of England the finest orator of his day. Imbued with the very spirit of the classics, he was a most accomplished scholar; and though early introduced into public life, and almost constantly occupied, from the entrance of his manhood, in the details of official business, and the bickerings of party politics, the practical wisdom he thus treasured up, never impeded the felicity with which, on all occasions, he brought into play the favourite subjects of his youthful studies. His fancy was elegant and prolific; his taste was exquisite; and to it, much more than to strict logic, were his orations indebted for their charms and their effect. He seldom followed closely out any regular train of argumentation; he never trammelled his reasoning in the stiff forms of a dialectician; but he caught with facility the general bearings, and striking relations of ideas: with never-failing tact he seized those views of his subject which were sure to tell most immediately upon his auditory and his opponents; and his thoughts flowed from him in a stream of uninterrupted fluency, in periods of the most sounding and graceful declamation. Yet he was never inflated or inane; it would scarcely be possible to select from his speeches a single sample of bombast. Accomplished in the use of all the arms that the rhetorician wields, his wit was the most glittering and piercing of his weapons. There he had no rival: that never failed him: though it excited against him many enmities, he was indebted to it for as many triumphs. He was a

matchless debater. As a practical statesman, his views were always clear and manly. He was the most unyielding opponent of all the schemes which, for more than thirty years, had thrown the world into confusion under the name of reform: and he had done his country much good service in maintaining the integrity of her existing institutions. He possessed, moreover, the high merit of never being seduced by fondness for any set of ideas, into forgetfulness of the necessities and relations of the actual world: rich as he was in fancy, he seemed to use it only as the handmaid to practical wisdom. The later acts of his public life, before he became minister, had, in an especial manner, strengthened his hold on the admiration and favour of the country. The spirit with which he broke loose from any suspicious connexion with the Holy Alliance, the recognition of the South American republics, and, above all, the energy and manliness with which, in maintenance of the national faith, he stretched forth the national arm to the defence of Portugal, had completely fallen in with the feelings of the public, and had identified him, in some measure, with the dignity and character of the empire. On the other hand, it is true, that there were circumstances which prevented a large and influential portion of the people from giving him as much of their confidence as they willingly gave him of their admiration. There were parts of his public life in which his steadiness of purpose and consistency of conduct might be questioned; there were others in which it might be doubted whether perfect good faith to his fellow-labourers had not been sacrificed to ambition: and the last act of his life, that coalition, by which he chose to be first, through the support of former opponents, rather than to remain second in name among former friends, was more than questionable. Mr. Canning's best and widest fame will always rest, like that of Lord Chatham, on what he performed as a foreign secretary. Englishmen will always remember him as a public servant, who in that capacity proudly maintained the honour, and asserted the dignity of the country among the nations; and they will remember him as having done that, than which the world presents no nobler exploit—as having made himself, by the mere force of talent, prime minister of England.

## BELZONI.

G. Belzoni, one of the most celebrated travellers of the present century, whose indefatigable researches among the antiquities of Egypt will immortalize his name, was a native of Padua, and was descended from Roman ancestry. The troubles of Italy in 1801, having driven him from his native city, the greater portion

of his youth was passed in Rome, where he was preparing to become a monk, when the sudden irruption of the French army into the ecclesiastical states, altered the course of his education, and from that time he led a life of wandering and vicissitude. It was his proficiency in hydraulics which suggested to him the project of his travels. He arrived in England in 1813, and for some time procured a livelihood by exhibiting experiments in hydraulics, &c. occasionally accompanied by feats of activity and strength, for which his Herculean mould peculiarly qualified him. Even under these depressing circumstances, the superiority of his character and manners, and the qualities of his mind, attracted the attention of discerning persons, who then ventured to predict that he was not likely to remain in obscurity. He married an English lady, who accompanied him on his subsequent adventures, and who exhibited uniformly a firmness in danger, and a patience in suffering, uncommon in her sex, and worthy of the companion of such a man. Having passed several years in England, and afterwards visited Portugal, Spain, and Malta, he was informed that an hydraulic machine would be of great service in Egypt, to irrigate the fields by an easier and more economical process than had hitherto been known in that country. He therefore embarked from Malta for Egypt, where he remained several years. During this residence, he had the good fortune to discover many remains of Egyptian antiquity, an account of which was communicated in his published narrative.

Having been recommended to Mr. Baghos, the principal interpreter of Mahomed Ali, the pasha of Egypt, the day was arranged on which Belzoni was to be presented to his highness, on the subject of erecting an hydraulic machine for that minister; but having been wantonly and savagely wounded in the leg by a Turkish soldier, he was confined for thirty days. On his recovery, however, he was at length presented to the pasha, and civilly received; and an arrangement was concluded, by which he undertook to frame a machine, which would raise as much water with one ox, as the machines of the country could raise with four. Our traveller's labours were carried on in the pasha's garden at Soubra on the Nile, three miles from Cairo, a small house within the walls of the governor's palace having been assigned to him for his residence. He succeeded in completing and setting the machine to work with one ox, which he computed would draw as much water as seven of the common machines of the country. But an accident, which took place in consequence of the obstinacy and carelessness of the natives, put a stop to the whole scheme. The Turks have a belief, that, when such accidents happen in the

commencement of any new invention, it is a bad omen. In consequence of this, exclusive of the prejudice against the machine itself, the pasha was persuaded to abandon the affair.

Belzoni's ardour for exploring antiquities, was not, however, cooled by this disappointment. Influenced by the suggestions of Mr. Salt, the British consul at Cairo, and of Mr. Burckhardt, who had generously offered to pay half the expense of his ascending the Nile, Belzoni departed for Thebes, where he commenced his arduous career of research. By their direction, and with their assistance, he undertook to transport the colossal head, called the Young Memnon, (now in the British Museum,) to England. For this purpose he ascended the Nile in 1817. Having visited in his progress thither the ruins of ancient Tentyra, on the western bank of the Nile, and examined with minute attention the largest of the three temples, whose remains still exist, and are in a fine state of preservation, he at length landed at Luxor, which is at a short distance from "the hundred-gated city." His approach to those stupendous remains seemed to him to be "like entering a city of giants, who, after a long conflict, were all destroyed, leaving the ruins of their various temples as the only proofs of their former existence." At the foot of the Libyan chain of mountains is a tract of rocks, called Gournou, lying to the west of Thebes, and extending in length about two miles, which is hollowed out into chambers and galleries, where the ancient inhabitants deposited their dead. No mines or catacombs in any part of the world can be compared with these astonishing places, the number, and enormous extent of which, attest the vast population of a city, whose antiquity reaches far beyond all historical notice. For though the ruins of Thebes afford the most complete evidence of the genius and amazing resources of the early Egyptians, no record enables us to form the slightest conjecture as to the date of its foundation.

In 1820, Mr. Belzoni returned to England with numerous and important remains of antiquity, among which was the colossal bust of Memnon before mentioned. During the years 1821 and 1822, these were exhibited at the Gothic Hall, Pall Mall, London. By the aid of a model on a large scale, and appropriate paintings, he was also able to convey in his exhibition a tolerable idea of the extraordinary tomb at Thebes, supposed to have been that of Psammis, the Egyptian monarch, which, by his persevering exertions, he was the first to explore.

The following year, during the researches of Major Denham and Captain Clapperton, in the interior of Africa, Belzoni's ardent mind prompted him to enter the same field of discovery, on his

own account, and at his own expense. His plan appears to have been to proceed by the way of Gibraltar, Tangier, and Fez, to Tombuctoo. He acquired the confidence and good-will of the Moorish government; but meeting with obstacles from the jealousy of the British residents there, after having penetrated to north lat. 21°, he was obliged subsequently to alter his plan. From Mr. Belzoni's own statement it appears that the expenses of his journey to and from Fez, and residence there, with the necessary presents and other articles, amounted to the sum of 1000*l.* defrayed by himself. Through the interest of the Moorish minister at Fez, an express dromedary had been sent from Fez to Tombuctoo, with money and letters for Belzoni, in case the caravan should already have departed for Tombuctoo. It is difficult to ascertain exactly what were the obstacles to his progress in the route which he had thus prosperously commenced. In his private correspondence at this time, he complains bitterly of the treatment he had received, and, before the termination of the year, had decided to alter his course, and proceed from the Bight of Benin northward, and join the other travellers, Clapperton and Denham, at Haussa. As he did not survive to accomplish that important object, the results anticipated in a scientific point of view, from the exertions of such a man, must, however reluctantly, be abandoned. The feelings of his mind at the change of his route were expressed in the following letter to a gentleman at Cambridge, from Cape Coast, dated October 26, 1823, which was only a short time before his death. "I write to you, my dear friend, by a transport which is just sailing for England, and send you a few lines in haste. I cannot enter at present into a detail of all the events which brought me to this coast, but reserve them till I write you more fully. I am only able now to tell you, that I am going to take a northern direction from the kingdom of Benin, straight up to Haussa. Benin is situate on the east of this coast, and the route I intend to take is over a tract of land entirely unknown, so that I hope I shall not be deemed an intruder in the path of northern travellers. I shall endeavour to give you a full account, if possible, from Benin; but I fear it will be a long time before you receive any of my letters from that quarter. If God please, I hope to meet the Niger on the east of Haussa, previous to my reaching the capital of that kingdom. I shall not fail to write to you by the first opportunity of a caravan to the north. I could not take many notes of what I observed at this place, and I am surprised that so little is known of it in England, or, indeed, of the settlements on this coast. In my voyage here, I fortunately met with an English gentleman, captain

of a man of war, a native of Plymouth, who, in consequence of the death of Sir R. Mends, has taken the command of the squadron on this coast, as senior officer. He is enthusiastic in every thing that relates to the discovery, and I feel myself highly indebted to this gentleman for the kind assistance he has afforded me in the furtherance of my views; and it is grateful to me, and I thank God that I have met with an Englishman, who has in some measure balanced the injuries I have sustained from those I will not name to you at Tangier. Remember me most kindly to all friends. I shall write to you again as soon as I am able."

The gentleman here thus handsomely mentioned, was Captain Filmore, R.N. who landed Mr. Belzoni at Benin. He exerted himself arduously in assisting the intrepid traveller, and discharged a man from his vessel who was a native of Haussa, that he might accompany Mr. Belzoni on his route. The following extract of a letter contains most of the late particulars respecting this enterprising and scientific individual. It is dated from British Acera, January 7, 1824. "On the night of the 24th of November, he (Mr. Belzoni) left us with Mr. Houtson, for Gato. On parting with us, he seemed a little agitated, particularly when the crew, (of the brig which brought him,) to each of whom he had made a present, gave him three loud cheers on leaving the vessel. 'God bless you, my fine fellows, and send you a happy sight of your country and friends!' was his answer. On the 3d of December, I received a letter from Mr. Houtson, requesting me to come to Benin, as Mr. Belzoni was lying dangerously ill, and, in case of death, wishing a second person to be present. I was prevented going, not only by business, but a severe fever which then had hold of me. On the 5th I had a second letter from Mr. Houtson, with the particulars of Mr. Belzoni's end, and one from himself, almost illegible, dated December 2, requesting me to assist in the disposal of his effects, and to remit the proceeds home to his agents, Messrs. Briggs, Brothers, and Co., America Square, London, together with a beautiful amethyst ring he wore, which he seemed particularly anxious should be delivered to his wife, with the assurance he died in the fullest affection for her, as he found himself too weak to write his last wishes and adieus.

"Belzoni was buried at Gato the day after his decease, and a board with the following inscription was placed over his grave.

Here lie the remains of
G. Belzoni,
Who was attacked with dysentery at Benin,
(On his way to Haussa and Tombuctoo,)
On the 26th November, and died at this place, December 3, 1823.

"The gentlemen who placed this inscription over the grave of this intrepid and enterprising traveller, hope that every European visiting this spot, will cause the ground to be cleared, and the fence round the grave repaired if necessary."

There is scarcely a foreigner who has ever visited England, that has excited a more lively interest than Belzoni. In his person and mind, he seemed to combine the qualities which constitute the hero. A vigorous constitution and a muscular frame, a temperament of mind equally proof against petty difficulties and great discouragements, and a state of the nervous system so happily fortified, as to carry him along undismayed by danger, and untired with toil, seem to have concurred in sustaining him through the course of his herculean achievements. In stature he was above six feet and a half, and possessed of great bodily strength. His manners and deportment were marked by great suavity and mildness, and he had a genuine love for science in all its branches. He was brave, ardent, and persevering in pursuit of his objects; and his decease at the moment of a strong hope of success, must be deeply felt by all who estimate the true interests of science and the light of discovery at their due value.

### SIR H. DAVY.

Sir H. Davy, the celebrated chemical philosopher, was born at Penzance, in Cornwall, in the year 1779. His father was by trade a carver in wood, and joiner, but he enjoyed a small patrimony, which being amply competent for his limited desires, we do not find that he attended much to his profession. Young Davy, having received the rudiments of a classical education under Dr. Cardew, of Truro, was placed with a professional gentleman named Tonkin, at Penzance, that he might acquire a knowledge of the profession of a surgeon and apothecary. His master, however, soon became dissatisfied with his new pupil; instead of attending to the duties of the surgery, Humphrey was experimenting in the garret; and upon one occasion, he produced an explosion that put the doctor and his phials in jeopardy. At length a negotiation between the parents and the master commenced, with a view of releasing the parties from their engagement, and Humphrey returned home. It is not difficult to understand how it happened, that a person endowed with the genius and sensibilities of Davy, should have had his mind directed to the study of mineralogy and chemistry, when we consider the nature and scenery of the country in which accident had planted him. Accordingly we find him from this time eagerly pursuing those

studies. The first original experiment performed by him at Penzance, was for the purpose of ascertaining the nature of the air contained in the bladders of sea-weed. His instruments, however, were of the rudest description, manufactured by himself out of the motley materials which fell in his way; the pots and pans of the kitchen were appropriated without ceremony, and even the phials and gallipots of his master were, without the least remorse, put in requisition.

A prominent circumstance in Davy's life was his introduction to Mr. Gilbert, the distinguished and popular president of the Royal Society. Mr. Gilbert's attention was, from some trivial cause, attracted to the young chemist, as he was carelessly lounging over the gate of his father's house. A person in the company of Mr. Gilbert observed, that the boy in question was young Davy, who was much attached to chemistry. "To chemistry!" said Mr. Gilbert, "if that be the case, I must have some conversation with him." Mr. Gilbert, who possessed a strong perception of character, soon discovered ample proofs of genius in the youth, and therefore offered him the use of his library, or any other assistance that he might require, for the pursuit of his studies. Here he was also introduced to Mr. Watt, and Dr. Beddoes. The latter had just established his Pneumatic Institution of Bristol, and required an assistant in his laboratory; the situation was offered to Davy, and by him eagerly accepted. Davy was now constantly engaged in the prosecution of new experiments; in the completion of which, as he himself informs us, he was greatly aided by the conversation and advice of Dr. Beddoes. He was also occasionally assisted by Mr. W. Clayfield, to whom he was indebted for the invention of a mercurial air-holder, by which he was enabled to collect and measure the various gases submitted to examination. In the course of these investigations, the respirability and singularly intoxicating effects of nitrous oxide were first discovered, which led to a new train of research; his inquiries were also extended to the different substances connected with nitrous oxide, such as nitrous gas, nitrous acid, ammonia, &c.; and he was enabled to present a clear and satisfactory history of the combinations of oxygen and nitrogen. These interesting results were published in a separate volume, entitled, "Researches, Chemical and Philosophical, chiefly concerning Nitrous Oxide, and its Respiration; by Humphrey Davy, Superintendent of the Medical Pneumatic Institution."

Soon after this, about the year 1801, Count Rumford having made inquiry for some rising philosopher who might fill the chemical chair in the newly-established institution of Great Britain,

Davy was proposed, and immediately elected. In this new scene it is admitted by his greatest admirers that he lost something of that simplicity of manners which constituted the former charm of his character, but he still pursued his studies with undeviating steps. While he assumed somewhat of the airs and garb of a man of fashion, and was frequently attracted by the charms of the ball-room, he did not abandon the pursuits of the laboratory. So popular did he become under the auspices of the Duchess of Gordon, and other leaders of fashion, that their soirées were considered incomplete without his presence; and yet the crowds that repaired to the institution in the morning, were, day after day, gratified by newly-devised and instructive experiments, performed with the utmost address, and explained in language at once the most intelligible and the most eloquent.

About A. D. 1803, two years after his introduction to the scientific world, having been elected professor of chemistry to the Board of Agriculture, Davy commenced a series of lectures before its members; and which he continued to deliver every successive session for ten years, modifying and extending their views, from time to time, in such a manner as the progress of chemical discovery might require. These discourses were published in the year 1813, at the request of the president and members of the board; and they form the only complete work we possess on the subject of agricultural chemistry.

In the year 1803, Davy was elected a fellow of the Royal Society; he subsequently became its secretary, and lastly, its president. During a period of five and twenty years, he constantly supplied its transactions with papers; and it is not too much to say, that no individual philosopher, in any age or country, ever contributed so largely in extending truth, or ever achieved so much in eradicating error. It is on the experiments detailed in his Chemical Philosophy, that the most correct views now entertained in relation to electricity, magnetism, &c., are chiefly founded, and to these also we may trace the rise of the new science of electro-magnetism.

Sir H. Davy spent a large portion of the latter years of his life in travelling, or in transient residences in different parts of the continent of Europe. In France his name and character have ever been treated with a degree of respect almost amounting to veneration. He died at Geneva in July, 1829, in the fiftieth year of his age, and a monument has been erected to his memory in Westminster Abbey.

## Section II.—Naval and Military Men.

### COLUMBUS.

Christopher Columbus, or Colon, the well known navigator, and discoverer of America, as is generally agreed, was a citizen of the republic of Genoa, though other countries have claimed the honour of giving him birth, but the exact place of his nativity has never been ascertained with certainty. In the life of Columbus, written by his son Don Ferdinand, his letter to the king and queen of Portugal are preserved, which prove that he was born in the year 1447. It is doubtful whether the family from which he descended was of any rank; but however this may be, it is certain that at the time of his birth, his parents were in indigent circumstances. They were seafaring people, and Columbus having discovered, in his early youth, both talents and inclination for that way of life, they contrived to have him instructed in every thing which was needful to a skilful navigator. Having attained with surprising quickness a competent knowledge of geometry, astronomy, and the theory of navigation, he went to sea at the age of fourteen. His first voyages were to those parts of the Mediterranean frequented by the Genoese, after which he took a voyage to Iceland, and proceeded further north, advancing several degrees within the polar circle. His fortune was not much improved by these voyages, but he obtained by them a great accession of skill and experience, and began to taste the delight arising from the consciousness of having done what no one had before attempted. After this, Columbus entered into the service of a sea captain of his own name and family. With him he continued for several years, no less distinguished for his courage than his experience as a sailor. At length, in an obstinate engagement off the coast of Portugal, the vessel on board which he served took fire; Columbus threw himself into the sea, laid hold of a floating oar, and by the support of it, and his dexterity in swimming, he reached the shore, though about two leagues distant. After this disaster, Columbus repaired to Lisbon, where he married a daughter of Bartholomew Perestrello, one of the captains employed by prince Henry in his early navigations, and who had discovered and planted the islands of Porto Santo and Madeira. By the perusal of the journals and charts of this experienced navigator, Columbus was inspired with an irresistible desire of visiting unknown countries. At this period the great object of inquiry was the discovery of a passage by sea to the East Indies. The danger and tediousness of the passage

proposed by the Portuguese round the Cape of Good Hope, set Columbus on considering whether a more direct way might not be discovered; and, after reasoning upon the facts of the rotundity of the earth, the small proportion of it occupied by the continents of Europe, Asia, and Africa, and the probability that the remainder was not wholly a barren ocean, he at length came to the conclusion, that, by sailing across the Atlantic Ocean, directly towards the west, new countries, which probably formed a part of the vast continent of India, must infallibly be discovered. This conclusion was strengthened by the mistakes of the ancient geographers respecting the most eastern parts of Asia, which they supposed to extend much farther to the east than they really do. Columbus naturally inferred that these countries might be visited by sailing in a westerly direction. In 1474, he communicated his ideas on this subject to his contemporary Paul, a physician of Florence, a man eminent for his knowledge in cosmography and geometry. He approved of the plan, suggested several facts in confirmation of it, and warmly encouraged Columbus to persevere in an undertaking so laudable, and which must redound so much to the honour of his country, and the benefit of Europe.

The first step necessary to the prosecution of his design was to secure the patronage of some of the European powers. Many years were spent in fruitless attempts to accomplish this end, and Columbus was treated as a visionary, who would doubtless perish in making so desperate an attempt. At length, however, he gained the approbation of Isabella, Queen of Portugal, and a treaty was signed with Columbus on the 17th of April, 1492. The chief articles of it were, that Columbus should be constituted admiral in all the seas, islands, and continents he should discover, with the same power and prerogatives that belonged to the admiral of Castile within the limits of his jurisdiction. He was also appointed viceroy in all the countries he should conquer; and a tenth of their products was granted to him for ever. All controversies or lawsuits with respect to mercantile transactions, were to be determined by the sole authority of Columbus, or of judges to be appointed by him.

On the 3d of August, Columbus set sail a little before sunrise, in presence of a vast crowd of spectators, who sent up their supplications to heaven for the prosperous issue of the voyage, which they wished rather than expected. On the 1st of October they were, according to the admiral's reckoning, 770 leagues to the west of the Canaries: but, lest his men should be intimidated by the prodigious length of the navigation, he gave out that they had proceeded only 584 leagues; and fortunately for Columbus,

neither his own pilot, nor those of the other ships, had skill sufficient to correct this error, and discover the deceit. They had now been above three weeks at sea, and had proceeded far beyond what former navigators had attempted or deemed possible. During the voyage their commander had from time to time flattered and amused them with the appearance of land, but this had altogether been illusive, and their prospect of success seemed now to be as distant as ever. This made an impression at first upon the ignorant and timid only, but extending by degrees to such as were better informed or more resolute, the contagion spread at length from ship to ship. From secret whispers or murmurings they proceeded to open cabals, and public complaints. They taxed their sovereign with inconsiderate credulity, in paying such regard to the vain promises and rash conjectures of an indigent foreigner, as to hazard the lives of so many of her own subjects in prosecuting a chimerical scheme. In spite of the arguments of Columbus, they all agreed that he should be compelled by force to return to Spain. Some of the more audacious proposed, as the most expeditious and certain method of getting rid at once of his remonstrances, to throw him into the sea; being persuaded that, upon their return to Spain, the death of an unsuccessful projector would excite but little concern, and be inquired into with no curiosity.

Columbus was fully sensible of his perilous situation. He had observed, with great uneasiness, the fatal operation of ignorance and fear in producing disaffection among his crew, and saw that it was now ready to burst out into open mutiny. He retained, however, perfect presence of mind. He affected to seem ignorant of their machinations. Notwithstanding the agitation and solicitude of his mind, he appeared with a cheerful countenance, like a man satisfied with the progress which he had made, and confident of success. Sometimes he employed all the arts of insinuation to soothe his men; sometimes he endeavoured to work upon their ambition or avarice, by magnificent descriptions of the fame and wealth they were about to acquire. On other occasions he assumed a tone of authority, and threatened them with vengeance from their sovereign, if, by their dastardly behaviour, they should defeat his noble effort to promote the glory of God, and to exalt the Spanish name above that of any other nation. Even with seditious sailors the words of a man whom they had been accustomed to reverence, were weighty and persuasive; and not only restrained them from those violent excesses which they meditated, but prevailed with them to accompany their admiral for some time longer.

As they proceeded, the indications of approaching land seemed

to be more certain, and excited hope in proportion. The birds began to appear in flocks, making towards the south-west. Columbus, in imitation of the Portuguese navigators, who had been guided in several of their discoveries by the motion of birds, altered his course from due west towards that quarter whither they pointed their flight. But after holding on for several days in this new direction, without any better success than formerly, having seen no object during thirty days but the sea and sky, the hopes of his companions subsided faster than they had risen; their fears revived with additional force; impatience, rage, and despair, appeared in every countenance. Columbus perceived that it would be of no avail to have recourse to any of his former arts, which, having been tried so often, had lost their effect; and that it was impossible to rekindle any zeal for the success of the expedition among men in whose breasts fear had extinguished every generous sentiment. He therefore promised solemnly to his men that he would comply with their request, provided they would accompany him, and obey his commands for three days longer; and if, during that time, land were not discovered, he would then abandon the enterprise, and direct his course towards Spain. Enraged as the sailors were, and impatient to turn their faces again towards their native country, this proposition did not appear to them unreasonable. Nor did Columbus hazard much in confining himself to a term so short. The presages of discovering land were now so numerous and promising, that he deemed them infallible. For some days the sounding line reached the bottom, and the soil which it brought up indicated land to be at no great distance. The flocks of birds increased; and were composed not only of sea fowl, but of such land birds as could not be supposed to fly far from the shore. From these symptoms, Columbus was so confident of being near land, that, on the evening of the 11th of October, after public prayers for success, he ordered the sails to be furled, and the ship to lie by, keeping strict watch lest they should be driven ashore in the night.

During this interval of suspense and expectation no man shut his eyes, all kept upon deck, gazing intently towards that quarter where they expected to discover the land which had been so long the object of their wishes. About two hours before midnight, Columbus, standing on the forecastle, observed a light at a distance, and privately pointed it out to Pedro Guttierez, a page of the queen's wardrobe. Guttierez perceived it, and calling to Salcedo, comptroller of the queen, all three saw it in motion, as if it were carried from place to place. A little after midnight the joyful sound of Land! Land! was heard from the Pinta, which

kept always ahead of the other ships. But having been so often deceived by fallacious appearances, every man was become slow of belief; and waited, in all the anguish of uncertainty and impatience, for the return of day. As soon as morning dawned, all doubts and fears were dispelled. From every ship an island was seen about two leagues to the north, whose flat and verdant fields, well stored with wood, and watered with many rivulets, presented the aspect of a delightful country. The crew of the *Pinta* instantly began the Te Deum, as a hymn of thanksgiving to God; and were joined by those of the other ships, with tears of joy and transports of congratulation. This office of gratitude to Heaven, was followed by an act of justice to their commander. They threw themselves at the feet of Columbus, with feelings of self-condemnation mingled with reverence. They implored him to pardon their ignorance, incredulity, and insolence, which had created him so much unnecessary disquiet, and had so often obstructed the prosecution of his well-concerted plan; and passing, in the warmth of their admiration, from one extreme to another, they now pronounced the man whom they had so lately reviled and threatened, to be a person inspired by Heaven with sagacity and fortitude more than human, in order to accomplish a design so far beyond the ideas and conceptions of all former ages. As soon as the sun rose, all their boats were manned and armed. They rowed towards the island with their colours displayed, with warlike music, and other martial pomp. As they approached the coast, they saw it covered with a multitude of people, whom the novelty of the spectacle had drawn together, whose attitudes and gestures expressed wonder and astonishment at the strange objects which presented themselves to their view. Columbus was the first European who set foot in the new world which he had discovered. He landed in a rich dress, and with a naked sword in his hand. His men followed, and, kneeling down, they all kissed the ground which they had so long desired to see. They next erected a crucifix, and prostrating themselves before it, returned thanks to God for conducting their voyage to such a happy issue. This was one of the Bahama Islands; to which he gave the name of San Salvador, and took possession of it in the name of their catholic majesties. In this first voyage he discovered several other of the Lucayo or Bahama Islands, with those of Cuba and Hispaniola, or St. Domingo.

Having visited several of the West India Islands, and settled a colony in Hispaniola, he again set sail for Spain; and after escaping great dangers from violent tempests, arrived at the port of Palos, on the 15th of March, 1493. As soon as Columbus's ship

was discovered approaching, the inhabitants of Palos ran eagerly to the shore, where they received the admiral with royal honours. The court was then at Barcelona, and Columbus took care immediately to acquaint the king and queen of his arrival. They were no less delighted than astonished with this unexpected event. Every mark of honour that could be suggested by gratitude or admiration was conferred on Columbus; and former capitulation was confirmed, his family was ennobled, and a fleet was ordered to be equipped, to enable him to go in quest of those more opulent countries which he still expected to find. Notwithstanding all this respect, however, Columbus was regarded with jealousy by Ferdinand and his courtiers. The commission allowed to Columbus was thought too ample, and the powers entrusted to him too great. The colonists he carried over with him became unreasonable and unmanageable, so that he was obliged to use some severities with them; and complaints of his cruelty were made to the court of Spain. Francis de Bovadilla, a knight of Calatrava, was at length appointed to inquire into the conduct of Columbus, with orders, if he could prove any charge against him, to supersede him, and assume the office of governor of Hispaniola. The consequence of this was as might be expected, that Columbus was sent to Spain in chains. From these he was freed by Ferdinand, who was forced into a sense of shame by the indignation which the people did not hesitate to express; and an opportunity was granted him of vindicating his innocence. He was, however, deprived of all power, and notwithstanding his great services, and the solemnity of the agreement between him and Ferdinand, Columbus never could obtain the fulfilment of any part of the treaty. It is impossible to read the account of the proceedings against this noble-minded man with tolerable patience. He was afterwards employed in voyages to the western continent. At length, however, exhausted with fatigue and disappointment, he died at Valladolid in 1506. The following account of his death is from a work which has only lately appeared in England, entitled "Memorials of Columbus; now first published from the Original Manuscripts, by order of the Decurions of Genoa. By D. G. B. Spotorno."

"Overcome by the feelings of the ingratitude he had experienced, his constitution worn out by the gout and his past fatigues, and dejected in his mind at seeing himself thus poor and abandoned, after having opened the new hemisphere to the Spanish nation, this great man departed this life with sentiments of the greatest devotion, on the 20th of May, 1506, at Valladolid. His corpse was removed to Saville, and buried in the great church of that city, with great funeral pomp; and by order of King Ferdinand, whose

jealousy his death had extinguished, was honoured with a marble monument, with the following epitaph engraved upon it·

A Castilla y a Leon
Nuevo Mundo dio Colon.

(To Castille and to Leon a new world gave Colon.)

"This is the only inscription worthy of the immortal discoverer of the new world. The glory of the Genoese hero will be always unparalleled. A conqueror, says Bossi, may arise to surpass Alexander; a poet to excel Virgil; but no one can ever rival Columbus, because no new hemisphere remains to be discovered."

It is supposed that his race is extinct; nor is there any authentic portrait to transmit to future ages the lineaments of this extraordinary man. In default of the latter, the Genoese have composed, from the written descriptions, a likeness which surmounts the monument they have erected to his honour, and two prints of which adorn the volume alluded to.

Among the documents in the appendix to this work is the following most interesting paper, entitled "Copy of a Letter written by the Admiral, to the Nurse of the Prince Don John, (to whom be glory,) in the year 1500, on his arrival from the Indies as a prisoner." In this, Columbus pours forth his grievances in a plain and manly way, which, while it carries conviction to the understanding, melts the heart with pity, or fills it with indignation.

"If," he begins, "my complaint against the world is new, its custom of ill-treating me is old. A thousand combats I have had with it, and in all have resisted successfully until the present, in which neither arms nor prudence have availed me; it keeps me cruelly overwhelmed. My trust in Him who created all, alone supports me; his assistance I have ever found near at hand. I entered with the most sincere affection into the services of their highnesses, and I have rendered them such service as was never seen or heard of before. Seven years were passed in treaty, and nine in execution. Most extraordinary and memorable events took place during that time, of which you can have no conception. I declare, upon my honour, that there is not one being, however low, who has not tried to insult and degrade me. Thank Heaven! there are some persons who disapprove of it. Had I robbed the Indies, or the land contiguous to it, and which is now talked of at the altar of Saint Peter, and given them to the Moors, they could not have shown greater enmity in Spain against me. Who would have believed this of a country, which has always been so renowned for its generosity!"

He then refutes *seriatim* all the idle or villanous charges brought against him, and clearly explains his actions and motives. He says, "Having experienced greater mischief from the calumnies of individuals, than advantage from my long services, and the privileges granted to me, it would be an act of charity if their highnesses would be pleased to dismiss a number of those who have occasioned my sufferings, and my honour would be re-established, and made manifest to the whole world; for such is the quality of the undertaking, that it increases daily in fame and reputation. I ought to be judged as a captain, who went forth from Spain to the Indies to conquer a numerous and warlike people, whose customs and ideas are entirely different from ours, inhabiting a rugged and mountainous country, without any regular towns like our own; by God's blessing I have already brought under the dominion of the King and Queen, our lords, another world; by which Spain, which was looked upon as poor, is become very rich. I ought to be judged as a captain, who for a length of time, up to this very day, have borne arms without ever quitting them; and by real warriors, such as myself, and not by lawyers, unless they were Greeks and Romans, or any modern nation; of such there are so many great and noble ones in Spain. To be judged in any other way is doing me great injustice, as there are no towns nor regular community in the Indies."

## DUKE OF MARLBOROUGH.

John Churchill, frequently called the renowned Duke of Marlborough, was the second son of Sir Winston Churchill, a gentleman who had suffered during the civil war, and was born at Ashe, in Devonshire, in 1650. His father introduced him at court while very young, and he was made page of honour to the Duke of York, afterwards king James II., when only twelve years of age. In 1666 he was made an ensign in the guards during the first Dutch war; and afterwards improved himself greatly in the military art at Tangier. In 1672 Mr. Churchill attended the Duke of Monmouth, who commanded a body of auxiliaries in the French service, and was soon after made a captain in his grace's regiment. At the siege of Nimeguen, which happened in that campaign, he distinguished himself so much that he was taken notice of by the celebrated Marshal Turenne, who bestowed on him the name of "the handsome Englishman." In 1673 he was at the siege of Maestricht, where he displayed so much courage, that the king of France made him a public acknowledgment of his

services; and the duke of Monmouth, who had the direction of the attack, told king Charles II. that he owed his life to Mr. Churchill's conduct.

On his return home the king promoted him to the rank of Lieutenant-Colonel, and the duke of York made him gentleman of his bed-chamber, and master of the robes. The second Dutch war being over, Colonel Churchill was again obliged to pass his days at court, where he conducted himself with great prudence and circumspection in the factious times that ensued.

In the beginning of the year 1679, when the duke of York was constrained to retire from England to the Low Countries, Colonel Churchill attended him, as he did throughout all his peregrinations, till he was suffered to reside again in London. While he waited upon the duke in Scotland, he had a regiment of dragoons given him; and in 1681 he paid his addresses to Mrs. Sarah Jennings, daughter of Richard Jennings, Esq. of Sandridge, in Hertfordshire, one of the most handsome and accomplished ladies of the court, and then in attendance on the princess, afterwards Queen Anne.

The first use made by his royal highness of his interest, after his return to court, was to obtain a title for his favourite, who, by letters patent, bearing date on the first of December, 1682, was created Baron Churchill of Aymouth, in Scotland, and also appointed colonel of the third troop of guards.

He was continued in all his posts by that prince, when James II. He assisted at the coronation, on the 23d of April, 1685; and in May following was created a peer of England, by the title of Baron Churchill, of Sandridge, in the county of Hertford.

In June, Lord Churchill, being then lieutenant-general of his majesty's forces, was ordered into the west, to suppress the duke of Monmouth's rebellion; which he did in a month's time, with an inconsiderable body of horse, and took the duke himself prisoner. He was extremely well received by the king at his return from this victory; but soon discerned his majesty's intention to establish the Roman Catholic religion; and therefore abandoned the royal cause, and joined that of the prince of Orange.

Lord Churchill was graciously received by that prince; and it is supposed to have been in consequence of his lordship's solicitations that Prince George of Denmark went over to him, as his consort, the Princess Anne, did soon after, by the advice of Lady Churchill. He was entrusted, in that critical conjuncture, by the prince of Orange, first to re-assemble his troop of guards at London, and afterwards to reduce some lately raised regiments,

and to new model the army; for which purpose he was invested with the rank and title of lieutenant-general.

Lord Churchill was one of the peers who voted that the throne was vacant; and, in consequence, the prince and princess of Orange being declared king and queen of England, upon the 6th of February, 1689, his lordship was, on the 14th, sworn of their privy-council, and one of the gentlemen of the bed-chamber to the king; and, on the 9th of April following, was raised to the dignity of earl of Marlborough, in the county of Wilts.

He assisted at the coronation of their majesties, and was soon after made commander-in-chief of the English forces sent over to Holland. He commanded at the battle of Walcourt, in the province of Namur, which was fought on the 15th of August, 1689; and gave such extraordinary proofs of his skill, that Prince Waldeck, speaking in his commendation to King William, declared, "That he saw more into the art of war in a day, than some generals in many years."

Yet all his services did not hinder his being disgraced in a very sudden manner, in 1691; for, being in waiting at court, as lord of the bed-chamber, and having introduced to his majesty Lord George Hamilton, he was soon followed to his own house by that nobleman, with this short and surprising message, "That the king had no farther occasion for his services;" the more surprising, as his majesty, just before, had not discovered the least coldness or displeasure towards him. The cause of this disgrace is supposed to have proceeded from his too close attachment to the interest of the Princess Anne.

This unexpected blow was followed by an event of a more extraordinary nature; for the earl and several other noblemen were committed to the tower upon a charge of high treason, which eventually proved to be a forgery; the lords were released, and the matter ended in a prosecution, on their parts, of the offenders.

After Queen Mary's death, when the interest of the two courts were brought to a better agreement, King William thought fit to recall the earl of Marlborough to his privy-council; and in June, 1698, appointed him governor to the duke of Gloucester, with this extraordinary compliment, "Make him but what you are, and my nephew will be all I wish to see him."

The earl discharged the important duty of governor to the young prince in a manner equally satisfactory to the king and the nation; and great hopes were conceived of the promising genius of the royal pupil, when he was seized with a fever, occasioned by his overheating himself on his birthday, the 24th of July, 1700, and on the 29th it took him off, in the 11th year of his age.

Soon after the death of the duke of Gloucester, King William made the earl of Marlborough commander-in-chief of the British forces in Holland, and ambassador-extraordinary to the States General; and this was one of the last marks of honour the earl received from King William, except the recommendation of his lordship to the Princess Anne, a little before his death, as the most proper person to be trusted with the command of the army which was to protect the liberty of Europe.

In March, 1702, about a week after the king's death, he was elected knight of the most noble order of the garter; and soon after declared captain-general of all her majesty's forces in England and abroad. War having been declared, the earl took the command on the 20th of June; and, in this single campaign, made himself master of the castles of Gravenbroeck and Wærts; the towns of Venlo, Ruremond, and Stevenswært; together with the city and citadel of Liège, which last was taken sword in hand. On his return to England after the campaign, he was created marquis of Blandford, and duke of Marlborough, with a pension of £5000 per annum.

Early in the campaign of 1704, the duke embarked for Holland; where, staying about a month to adjust the necessary steps, he began his march towards the heart of Germany, and after a conference held with Prince Eugene of Savoy and Prince Louis of Baden, he arrived before the strong entrenchments of the enemy at Schellenburg, very unexpectedly, on the 21st of June; and, after an obstinate and bloody battle he entirely routed them. It was on this occasion that the emperor wrote the duke a letter with his own hand, acknowledging his great services, and offering him the title of a prince of the empire, which he modestly declined, till the queen afterwards commanded him to accept of it.

The duke made the best advantage of his success, and having advanced with the confederate army within a league of Augsburg, where the elector of Bavaria was securely encamped under the cannon of that city, his grace so effectually cut off his communication with his electoral dominions, that seeing his subjects left to the mercy of the confederate army, he had actually agreed with the duke of Marlborough to sign a treaty of peace, and abandon the French interest, when he received the news that Marshal Tallard, who commanded the French army, was on the point of joining him, which he did soon after. This change of affairs brought on the famous battle of Hochstedt, a town near the village of Blenheim; it was fought on the 13th of August, 1704, and the confederate army, under the command of Prince Eugene and the duke of Marlborough, gained a complete victory over the French

and the Bavarians. More than 10,000 French and Bavarians were killed in this memorable battle; near 10,000 were wounded or drowned in the Danube; Marshal Tallard, the commander in chief of the French forces, was taken prisoner, and with him 13,000 of the combined army; 100 pieces of cannon, 24 mortars, 129 colours, 171 standards, 17 pairs of kettle-drums, 3600 tents, 34 coaches, 300 mules laden with provisions, ammunition, and baggage, 2 bridges of boats, and 15 barrels and 8 casks of silver, were the spoils of the day. But what is still more remarkable, the victors lost only 4500 men killed, and about 8000 wounded or taken prisoners. This battle is generally styled in history the battle of Blenheim; though it is sometimes called that of Hochstedt.

After this glorious action, by which the empire was saved, and the whole electorate of Bavaria conquered, the duke continued his pursuit till he forced the French to repass the Rhine. Then Prince Louis of Baden laid siege to Landau, while the duke and Prince Eugene covered it: but it was not taken till the 12th of November. The duke made a tour also to Berlin; and, by a short negotiation, suspended the disputes between the king of Prussia and the Dutch, by which he gained the good will of both parties.

When the campaign was over he returned to Holland, and on the 14th of December arrived in England. He brought over with him Marshal Tallard, and twenty-six other officers of distinction, and the colours: which, by her majesty's order, were put up in Westminster Hall.

He was received by the queen and her royal consort with the highest marks of esteem, and had the solemn thanks of both houses of parliament. Besides this the commons addressed her majesty to perpetuate the memory of this victory: which she did, by granting Woodstock, with the hundred of Wootton, to him and his heirs for ever. This was confirmed by an act of parliament which passed on the 14th of March following, with this remarkable clause, "That they should be held by the duke and his heirs, on condition of tendering to the queen, her heirs, and successors, on the 2d of August, every year, for ever, at the Castle of Windsor, a standard with three *fleurs-de-lis*, the arms of France, painted thereon."

The comptroller of the queen's works was likewise ordered to build a magnificent palace for the duke in Woodstock Park, which was called Blenheim House, and is now a standing memorial of the general's and the nation's glory, acquired by one of the most celebrated victories in the annals of Europe.

The next campaign, 1705, was attended by no remarkable results; but the following year the allies were more successful than the

former. The duke in the beginning of April embarked for Holland and, after several inferior advantages, he gained a complete victory over the duke of Bavaria and Marshal Villeroy, at the village of Ramillies, on the 12th of May, being Whitsunday. The French and the Bavarians lost several thousand men, besides 6000 taken prisoners, with great part of their artillery and baggage; the loss of the allies was very inconsiderable: and this victory is known in history by the title of the battle of Ramillies.

The advantages gained by this victory were so far improved by the vigilance and wisdom of the duke, that Louvain, Brussels, Mechlin, and even Ghent and Bruges, submitted to King Charles III. of Spain without a stroke, and Oudenard surrendered upon the first summons. The city of Antwerp followed this example. And thus, in the short space of a fortnight, the duke reduced all Brabant, and the marquisate of the Holy Empire, to the obedience of King Charles. He afterwards took the towns of Ostend, Menin, .Dendermonde, and Æth.

The forces of the allies, after this glorious campaign, being about to separate, his grace, on the 7th of October, went to the Hague: where the proposals which France had made for peace contained in a letter from the elector of Bavaria to the duke of Marlborough, were communicated to the ministers of the allies; after which his grace embarked for England.

He arrived at London on the 8th of November; and though at this time there was a party formed against him at court, yet the great services he had done the nation, and the personal esteem the queen always had for him, procured him a universal good reception.

The campaign of the year 1707 proved the most barren one he ever made; which was chiefly owing to a failure on the part of the allies, who began to relax in their support of the common cause. Nor did affairs go on more to his mind at home; for, upon his return to England, after the campaign was over, he found that the secret influence against him, which he had suspected the year before, had broken out in his absence; that the queen had a female favourite, who was in a fair way of supplanting the duchess; and that she listened to the insinuations of a statesman who was not his friend. He is said to have borne all this with firmness and patience, though he easily saw to what it tended; and he went to Holland, as usual, early in the spring of the year 1708, arriving at the Hague on the 19th of March.

The ensuing campaign was carried on by the duke, in conjunction with Prince Eugene, with such prodigious success, that the French king thought fit, in the beginning of the year 1709, to set on foot a negotiation for peace.

The House of Commons this year gave an uncommon testimony of their respect for the duke of Marlborough; for, besides addressing the queen, they, on the 22d of January, 1709, unanimously voted thanks to his grace, and ordered them to be transmitted to him abroad by the speaker.

His grace returned to England on the 25th of February; and on his first appearance in the House of Lords, received the thanks of that august assembly. His stay was so very short, that we need not dwell upon what passed in the winter. It is sufficient to say, that they who feared the dangerous effects of those artful proposals France had been making for the conclusion of a general peace, were also of opinion that nobody was so capable of setting their danger in a true light in Holland, as his grace of Marlborough. This induced the queen to send him thither the latter end of March, in the character of her plenipotentiary; which contributed not a little to the enemy's disappointment, by defeating all their projects.

Marshal Villars commanded the French army in the campaign of the year 1709; and Louis XIV. expressed no small hopes of him, in saying, a little before the opening of it, that "Villars was never beaten." However, the siege of Tournay, and the battle of Malplaquet, convinced that monarch that Villars was not invincible.

Tournay surrendered to the allies on the 30th of July, and on the 11th of September following was fought the battle of Blaregnies, or Malplaquet, near Mons; the allies were commanded by the duke of Marlborough and Prince Eugene, and the French by the famous marshals of France, Villars and Boufflers. Each army consisted of about 100,000 of the best troops ever seen in Europe; and after a most obstinate engagement, in which the allies had every difficulty to surmount, from the advantageous situation of the French army, they penetrated their intrenchments, and obliged the enemy to retreat; but this victory cost the allies very dear, for they lost 20,000 men. However, when the news arrived in England, the honour of gaining the day was thought so great, that the city of London renewed their congratulatory addresses to the queen; and her majesty in council, on the 3d of October following, ordered the proclamation for a general thanksgiving.

In the beginning of the year 1710 the French set on foot a new negotiation for a peace, which was commonly distinguished by the title of the treaty of Gertrudenburgh. The States General, upon this, having shown an inclination to enter into conferences with the French plenipotentiaries, the House of Commons immediately framed an address to the queen, that she would be pleased to send

the duke of Marlborough over to the Hague; with which request her majesty complied; and towards the latter end of February his grace went to the Hague, where he met with Prince Eugene, and soon after set out with him for the army, which was assembled in the neighbourhood of Tournay.

This campaign was very successful, many towns being taken, and fortresses reduced: notwithstanding which, when the duke came over to England, about the middle of December, he found his interest declining, and his services set at nought. The negotiations for peace which were carried on during a great part of the summer ended unfavourably; and soon after a change took place in the ministry, by which the duke's influence in councils of the the queen was greatly weakened. Nevertheless, his grace was kindly received by her majesty, who seemed desirous to have him live upon good terms with her new ministry; but this was thought impracticable; and it was every day expected that he would lay down his commission. He did not do this; but he carried the golden key, the ensign of the duchess of Marlborough's dignity, on the 9th of January, 1711, to the queen, and resigned all her employments with great duty and submission. With the same firmness and composure he consulted the necessary measures for the next campaign with those whom he knew to be no friends of his; and treated all parties with candour and respect.

An exterior civility, in court language styled a good understanding, being established between the duke and the new ministry, the duke went over to the Hague, to prepare for the next campaign, which, at the same time, he knew would be his last. He exerted himself in an uncommon manner, and it was attended with the usual success. The duke embarked for England when the campaign was over, and came to London upon the 8th of November.

He acquainted her majesty, in the audience he had at his arrival, that he could not concur in the measures of those who directed her councils, so he would not distract them by a fruitless opposition: yet, finding himself attacked in the House of Lords, and loaded with the imputation of having protracted the war, he vindicated his conduct and character with great dignity and spirit; and in a most pathetic speech appealed to the queen his mistress, who was there *incognito*, for the falsehood of that imputation; declaring that he was as much for a peace as any man, provided it was such a peace as might be expected from a war undertaken on so just motives, and carried on with uninterrupted success.

This had a great effect on that august assembly, and perhaps

made some impression on the queen; but, at the same time, it gave such an edge to the resentment of his enemies, who were then in power, that they resolved, at all events, to remove him. Those who were thus resolved to divest him of his commission, found themselves under a necessity to engage the queen to take it from him. This necessity arose chiefly from Prince Eugene's being expected to come over with a commission from the emperor; and to give some colour to it, an inquiry was promoted in the House of Commons, to fix a very high imputation on the duke, as if he had put very large sums of public money into his pocket. When a question to this purpose had been carried, the queen, by a letter conceived in very obscure terms, acquainted him with her having no farther occasion for his service, and dismissed him from all his employments.

He was from this time exposed to the most painful persecution. On the one hand, he was attacked by the clamours of the populace, and by those licentious writers who are always ready to espouse the quarrels of a ministry, and to insult without mercy those they can insult with impunity. On the other hand, a prosecution was commenced against him by the attorney-general, for applying public money to his private use; and the workmen employed in building Blenheim House, though set at work by the crown, were encouraged to sue his grace for the money that was due to them. All his actions were also shamefully misrepresented.

These difficulties, joined to his grief for the death of the earl of Godolphin, inclined his grace to gratify his enemies by a voluntary exile. Accordingly, he embarked at Dover upon the 14th of November, 1712; and landing at Ostend, went from thence to Antwerp, and so on to Aix la Chapelle, being every where received with the honours due to his high rank and merit. The duchess of Marlborough also attended her lord in all his journeys, and particularly in his visit to the principality of Mindelheim, which was given him by the emperor, and exchanged for another at the peace, which was made while the duke was abroad.

The conclusion of that peace was so far from restoring any harmony among the several parties of Great Britain, that it widened their differences exceedingly; insomuch that the chiefs, despairing of safety in the way they were in, are said to have secretly invited the duke of Marlborough back to England. Be this as it may, it is very certain that the duke took a resolution of returning a little before the queen's death; and, landing at Dover, came to London upon the 4th of August, 1714.

He was received with all possible demonstrations of joy by those who (upon the demise of the queen, which happened upon

the first of that month) were entrusted with the government; and upon the arrival of King George I. was particularly distinguished by acts of royal favour; for he was again declared captain-general and commander-in-chief of all his majesty's land forces, colonel of the first regiment of foot guards, and master of the ordnance.

His advice was of great use in concerting those measures by which the rebellion in the year 1715 was crushed, and this was his last effort in respect to public affairs; for his infirmities increasing with his years, he retired from business, and spent the greatest part of his time, during the remainder of his life, at one or other of his country houses.

His death happened on the 16th of June, 1722, at Windsor Lodge; and his corpse, upon the 9th of August following, was interred with the highest solemnity, in Westminster Abbey.

## COLONEL GARDINER.

The subject of the following memoir sustained, in a remarkable manner, the character of the Christian hero, and combined the two apparently opposite qualities of an eminently devotional spirit, with the courage and conduct belonging to the profession of arms.

Colonel James Gardiner was the son of Captain Patrick Gardiner, of the family of Torwood Head, by Mrs. Mary Hodge, of the family of Gladsmuir. The captain, who was master of a handsome estate, served many years in the army of King William and Queen Anne, and died abroad with the British forces in Germany.

Mrs. Gardiner, our colonel's mother, was a lady of excellent character; but it pleased God to exercise her with very uncommon trials; for she not only lost her husband and her brother in the service of their country, but also her eldest son, Mr. Robert Gardiner, on the day which completed the 16th year of his age, at the siege of Namur, in 1695.

Her second son, the subject of this memoir, was born at Carriden, in Linlithgowshire, on the 10th of January, 1688; the memorable year of that glorious revolution, which he justly esteemed among the happiest of all events.

Few remarkable things are on record concerning the early years of his life, only that his mother took care to instruct him, with great tenderness and affection, in the principles of true christianity. He was also trained up in human literature, at the school at Linlithgow, where he made a very considerable progress in the languages. The good effects of his mother's prudent and exemplary care were not so conspicuous as she wished and hoped,

in the younger part of her son's life; yet there is great reason to believe they were not entirely lost.

Could his mother, or a very religious aunt, (of whose good instructions and exhortations he has often spoken with pleasure,) have prevailed, he would not have thought of a military life: but it suited his taste; and the ardour of his spirit, animated by the persuasions of a friend who greatly urged it, was not to be restrained.

He served first as a cadet, which must have been very early: and then at fourteen years old he bore an ensign's commission in a Scotch regiment in the Dutch service; in which he continued till the year 1702, when he received an ensign's commission from Queen Anne, which he bore in the battle of Ramillies, being then in the nineteenth year of his age. In this ever-memorable action he received a wound in his mouth by a musket-ball, which had nearly cost him his life; the particulars of which event are thus related by Dr. Doddridge:—

"Our young officer was a party of the forlorn hope, and was commanded on what seemed almost a desperate service—to dispossess the French of the churchyard at Ramillies, where a considerable number of them were posted to remarkable advantage. They succeeded much better than was expected; and it may well be supposed, that Mr. Gardiner, who had before been in several encounters, and had the view of making his fortune to animate the natural intrepidity of his spirit, was glad of such an opportunity of signalizing himself. Accordingly, he had planted his colours on an advanced ground; and while he was calling to his men, (probably in that horrid language which is so peculiar a disgrace to our soldiery, and so absurdly common in such articles of extreme danger,) he received a shot into his mouth; which, without beating out any of his teeth, or touching the fore part of his tongue, went through his neck, and came out about an inch and a half on the left side of the vertebræ. Not feeling at first the pain of the stroke, he wondered what was become of the ball, and in the wildness of his surprise began to suspect he had swallowed it; but dropping soon after, he traced the passage of it by his finger, when he could discover it no other way.

"This accident happened about five or six in the evening, on the 23d day of May, in the year 1706; and the army pursuing its advantages against the French, without ever regarding the wounded (which was, it seems, the duke of Marlborough's constant method) our young officer lay all night in the field, agitated, as may well be supposed, with a great variety of thoughts. But expecting to recover, his mind was taken up with contrivances to secure his gold, of which he had a good deal about him; and he had recourse to a very odd

expedient, which proved successful. Expecting to be stripped, he first took out a handful of that clotted gore of which he was frequently obliged to clear his mouth, or he would have been choked: and putting it into his left hand, he took out his money (about nineteen pistoles), and shutting his hand, and besmearing the back part of it with blood, he kept it in this position till the blood dried in such a manner that his hand could not easily fall open, though any sudden surprise should happen, in which he might lose the presence of mind which that concealment otherwise would have required.

"In the morning, the French, who were masters of that spot, though their forces were defeated at some distance, came to plunder the slain; and seeing him, to appearance almost expiring, one of them was just applying a sword to his breast to destroy the little remainder of life, when in the critical moment, upon which all the extraordinary events of such a life as is afterwards proved were suspended, a cordelier, who attended the plunderers, interposed, taking him by his dress for a Frenchman, and said, "Do not kill that poor child." Our young soldier heard all that passed, though he was not able to speak one word; and, opening his eyes, made a sign for something to drink.

"They gave him a sup of some spiritous liquor, which happened to be at hand; by which, he said, he found a more sensible refreshment than he could remember from any thing he had tasted either before or since. Then signifying to the friar to lean down his ear to his mouth, he employed the first efforts of his feeble breath, in telling him (what, alas! was a contrived falsehood) that he was nephew to the governor of Huy, a neutral town in the neighbourhood; and that, if he could take any method of conveying him thither, he did not doubt but his uncle would liberally reward him. He had indeed a friend at Huy, from whom he expected a kind reception; but the relation was only pretended. On hearing this, they laid him on a sort of hand-barrow, and sent him by a file of musketeers towards the place; but the men lost their way, and got in a wood towards the evening, in which they were obliged to continue all night. The poor patient's wound being still undressed, it is not to be wondered that by this time it raged violently. The anguish of it engaged him earnestly to beg that they would either kill him outright, or leave him there to die, without the torture of any farther motion; and indeed they were obliged to rest for a considerable time, on account of their own weariness. Thus he spent the second night in the open air, without any thing more than a common bandage to staunch the blood. He has often mentioned it as a most astonishing

providence, that he did not bleed to death; which, under God, he ascribed to the remarkable coldness of these two nights.

"Judging it quite unsafe to attempt carrying him to Huy, from whence they were now several miles distant, his convoy took him early in the morning to a convent in the neighbourhood, where he was hospitably received, and treated with great kindness and tenderness. But the cure of his wound was committed to an ignorant barber-surgeon, who lived near the house; the best shift that could then be made at that time, when it might easily be supposed persons of ability in their profession had their hands full of employment. The tent which this artist applied was almost like a peg driven into the wound; and gentlemen of skill and experience, when they came to hear of the manner in which he was treated, wondered how he could possibly survive such management. But by the blessing of God on these applications, rough as they were, he recovered in a few months. The lady abbess, who called him her son, treated him with the affection and care of a mother; and he always declared that every thing which he saw within these walls was conducted with the strictest decency and decorum. He received a great many devout admonitions from the ladies there; and they would fain have persuaded him to acknowledge what they thought of so miraculous a deliverance, by embracing the catholic faith, as they were pleased to call it. But they could not succeed: for though no religion lay near his heart, yet he had too much of the spirit of a gentleman, lightly to change that form of religion which he wore, as it were, loose about him; as well as too much good sense to swallow those monstrous absurdities of popery, which immediately presented themselves to him, unacquainted as he was with the niceties of the controversy. When his liberty was regained by an exchange of prisoners, and his health thoroughly established, he was far from rendering unto the Lord according to that wonderful display of divine mercy which he had experienced."

Little is known of the particulars of those wild, thoughtless, and wretched years which lay between the 19th and 30th of his life; except it be that he frequently experienced the divine goodness in renewed instances, particularly in preserving him in several hot military actions, in all of which he never received so much as a wound after this, forward as he was in tempting danger; and yet, that all these years were spent in an entire alienation from God, and an eager pursuit of animal pleasure, as his supreme good. The series of criminal amours in which he was almost incessantly engaged during this time, must probably have afforded some remarkable adventures and occurrences; but the memory of them is perished.

Amidst all these pernicious wanderings from the paths of religion, virtue, and happiness, he approved himself so well in his military character, that he was made a lieutenant in that year, namely, 1706; and very quickly after promoted to a cornet's commission in Lord Stair's regiment of Scotch Grays; and on the 31st of January, in the year 1715, was made captain-lieutenant in Colonel Ker's regiment of dragoons. He had the honour of being known to the Earl of Stair some time before, and was made his aide-de-camp; and when, upon his lordship's being appointed ambassador from George I. to the court of France, he made a most splendid entrance into Paris, Captain Gardiner was his master of the horse; and a great deal of the care of that admirably well adjusted ceremony fell upon him; so that he gained great credit by the manner in which he conducted it. Under the benign influences of his lordship's favour (which to the last day of his life he retained) a captain's commission was procured for him (dated July 22, in the year 1715) in the regiment of dragoons commanded by Colonel Stanhope; and in the year 1717 he was advanced to the majority of that regiment: in which office he continued till it was reduced, on November the 10th, 1718, when he was put out of commission. But then his majesty was so thoroughly apprised of his faithful and important services, that he gave him his sign manual, entitling him to the first majority that should become vacant in any regiment of horse or dragoons, which happened about five years after to be in Croft's regiment of dragoons, in which he received a commission, dated June the 1st, 1724; and on the 20th of July, the same year, he was made major of an old regiment, commanded by the Earl of Stair.

We will now return to that period of his life which he passed at Paris, the scene of most remarkable and important events. He continued several years under the roof of the brave and generous earl of Stair, to whom he endeavoured to approve himself by every instance of diligent and faithful service. And his lordship gave no inconsiderable proof of the dependence which he had upon him, when, in the beginning of the year 1715, he entrusted him with the important despatches relating to the discovery which, by a series of admirable policy, he made of a design which the French king was then forming for invading Great Britain in favour of the Pretender.

While Captain Gardiner was in London, in one of the journeys he made upon this occasion, he ventured to predict, from what he knew of the bad state of the French king's health, that he would not live six weeks. This was made known by some spies who

were at St. James's, and came to be reported at the court of Versailles; for he received letters from some friends at Paris, advising him not to return thither, unless he could reconcile himself to a lodging in the Bastile. But he was soon free from that apprehension; for before half that time was accomplished, Louis XIV. died; and it is generally thought his death was hastened by a very accidental circumstance, which had some relation to the captain's prophecy. For the last time he ever dined in public, which was a very little while after the report of it had been made there, he happened to discover our British envoy among the spectators. The penetration of this illustrious person was too great, and his attachment to the interest of his royal master too well known, not to render him very disagreeable to that crafty and tyrannical prince. He at first appeared very languid, as indeed he was; but on casting his eye upon the earl of Stair, he affected to appear before him in a much better state of health than he really was; and therefore, as if he had been awakened on a sudden from some deep reverie, immediately put himself into an erect posture, called up a laboured vivacity into his countenance, and ate much more heartily than was by any means advisable, repeating it two or three times to a nobleman then in waiting, "Methinks I eat very well for a man who is to die so soon." But this inroad upon that regularity of living which he had for some time observed, agreed so ill with him, that he never recovered this meal, but died in less than a fortnight. This gave occasion for some humorous people to say, that old Louis after all was killed by a Briton.

The captain quickly returned, and continued with small interruptions at Paris, at least till the year 1720. This was in all probability the gayest part of his life, and the most criminal. Whatever wise and good examples he might find in the family where he had the honour to reside, it is certain that the French court during the regency of the Duke of Orleans was one of the most dissolute under heaven. What, by a wretched abuse of language, have been called intrigues of love and gallantry, were so entirely to the major's then degenerate taste, that if not the whole business, at least the whole happiness of his life consisted in them; and he had now too much leisure for one who was so prone to abuse it. His fine constitution, than which perhaps there was hardly ever a better, gave him great opportunities of indulging himself in these excesses; and his good spirits enabled him to pursue his pleasures of every kind in so alert and sprightly a manner, that multitudes envied him, and called him by a dreadful kind of compliment, "The happy rake."

Yet still the checks of conscience, and some remaining principles of a good education, would break in upon his most licentious hours; and when some of his dissolute companions were once congratulating him on his distinguished felicity, a dog happened at that time to come into the room, he could not forbear groaning inwardly, and saying to himself, "Oh, that I were that dog!" Such was then his happiness; and such is that perhaps of hundreds more, who bear themselves highest in the contempt of religion, and glory in that infamous servitude which they effect to call liberty. But these remonstrances of reason and conscience were in vain; and, in short, he carried things so far, in this wretched part of his life, that some sober English gentlemen, who made no great pretences to religion, how agreeable soever he might have been to them on other accounts, rather declined than sought his company, as fearing they might have been ensnared and corrupted by it.

At this time he was not without some secret monitions of conscience, and some casual efforts to reform his character; but they were overborne, again and again, by the force of temptation; and it is no wonder, that in consequence of them his heart grew yet harder. Nor was it softened or awakened by some very memorable deliverances, which at this time he received. He was in extreme danger by a fall from his horse, as he was riding post in the streets of Calais; when going down a hill, the horse threw him over his head, and pitched over him, so that when he rose the beast lay beyond him, and almost dead. Yet, though he received not the least harm, it made no serious impression on his mind. In his return from England in the packet-boat, but a few weeks after the former accident, a violent storm that drove them up to Harwich, tossed them from thence for several hours, in a dark night, on the coast of Holland, and brought them into such extremity, that the captain of the vessel urged him to go to prayers immediately, if he ever intended to do it at all; for he concluded they would in a few minutes be at the bottom of the sea. In this circumstance he did pray, and that very fervently too: and it was very remarkable, that while he was crying to God for deliverance, the wind fell, and quickly after they arrived at Calais. But the major was so little affected with what had befallen him, that when some of his gay friends, on hearing the story, rallied him upon the efficacy of his prayers, he excused himself from the scandal of being thought much in earnest, by saying, "that it was at midnight, an hour when his good mother and aunt were asleep; or else he should have left that part of the business to them."

And now we are come to that astonishing part of his story, the

account of his conversion, which we give in the language of Dr. Doddridge, his biographer.

"This memorable event happened towards the middle of July, 1719, but I cannot be exact as to the day. The major had spent the evening (and, if I mistake not, it was the sabbath) in some gay company, and had an unhappy assignation with a married woman, of what rank or quality I did not particularly inquire, whom he was to attend exactly at twelve. The company broke up about eleven; and not judging it convenient to anticipate the time appointed, he went into his chamber to kill the tedious hour, perhaps with some amusing book, or some other way. But it very accidentally happened that he took up a religious book, which his good mother or aunt had, without his knowledge, slipped into his portmanteau. It was called, if I remember the title exactly, 'The Christian Soldier,' or 'Heaven taken by Storm;' and was written by Mr. Thomas Watson. Guessing by the title of it, that he should find some phrases of his own profession spiritualized in a manner which he thought might afford him some diversion, he resolved to dip into it; but he took no serious notice of any thing he read in it: and yet, while this book was in his hand, an impression was made upon his mind (perhaps God only knows how) which drew after it a train of the most important and happy consequences.

"There is indeed a possibility, that while he was sitting in this attitude, and reading in this careless and profane manner, he might suddenly fall asleep, and only dream of what he apprehended he saw. But nothing can be more certain, than that, when he gave me this relation, he judged himself to have been as broad awake, during the whole time, as he ever was in any part of his life; and he mentioned it to me several times afterwards as what undoubtedly passed, not only in his imagination, but before his eyes.

"He thought he saw an unusual blaze of light fall on the book while he was reading, which he at first imagined might happen by some accident in the candle. But lifting up his eyes, he apprehended, to his extreme amazement, that there was before him, as it was, suspended in the air, a visible representation of the Lord Jesus Christ upon the cross, surrounded on all sides with a glory; and was impressed as if a voice, or something equivalent to a voice, had come to him to this effect (for he was not confident as to the very words) "O sinners! did I suffer this for thee, and are these the returns?" But whether this were an audible voice, or only a strong impression on his mind equally striking, he did not seem very confident, though, to the best of my remembrance, he rather judged it to be the former. Struck with so amazing a phenomenon

as this, there remained hardly any life in him, so that he sunk down in the arm-chair in which he sat, and continued, he knew not exactly how long, insensible (which was one circumstance that made me several times take the liberty to suggest that he might possibly be all this while asleep); but however that were, he quickly after opened his eyes, and saw nothing more than usual.

"It may easily be supposed he was in no condition to make any observation upon the time in which he had remained in an insensible state. Nor did he throughout all the remainder of the night once recollect that criminal and detestable assignation, which had before engrossed all his thoughts. He rose in a tumult of passion not to be conceived, and walked to and fro in his chamber, till he was ready to drop down in unutterable astonishment and agony of heart; appearing to himself the vilest monster in the creation of God, who had all his lifetime been crucifying Christ afresh by his sins, and now saw, as he assuredly believed, by a miraculous vision, the horror of what he had done. With this was connected such a view, both of the majesty and goodness of God, as caused him to loathe and abhor himself, and to repent as in dust and ashes. He immediately gave judgment against himself, that he was most justly worthy of eternal damnation; he was astonished that he had not been immediately struck dead in the midst of his wickedness; and (which I think deserves particular remark) though he assuredly believed that he should ere long be in hell, and settled it as a point with himself for several months, that the wisdom and justice of God did almost necessarily require that such an enormous sinner should be made an example of everlasting vengeance, and a spectacle as such both to angels and men, so that he hardly durst presume to pray for pardon; yet what he then suffered was not so much from the fear of hell, though he concluded it would soon be his portion, as from a sense of that horrible ingratitude he had shown to the God of his life, and to that blessed Redeemer who had been in so affecting a manner set forth as crucified before him."

The mind of Major Gardiner continued from this remarkable time till towards the end of October (that is, rather more than three months, but especially the two first of them) in as extraordinary a situation as one can well imagine. He knew nothing of the joys arising from a sense of pardon; yet he had such a sense of the evil of sin, of the goodness of the Divine Being, and of the admirable tendency of the christian revelation, that he resolved to spend the remainder of his life, while God continued him out of hell, in as rational and as useful a manner as he could; and to continue casting himself at the feet of divine mercy every day, and

often in a day, if peradventure there might be hope of pardon, of which all that he could say was, that he did not absolutely despair.

It was soon apparent that his views and feelings had undergone a total renovation. He was not only delivered from that bondage of corruption, which had been habitual to him for many years, but felt in his breast so contrary a disposition, that he was grieved to see human nature, in those to whom he was most entirely a stranger, prostituted to such low and contemptible pursuits. He therefore exerted his natural courage in a very new kind of combat, and became an open advocate for religion, in all its precepts relating to sobriety, righteousness, and godliness.

A remarkable instance of this happened about the year 1720, on Major Gardiner's first return to make any considerable abode in England, after this remarkable change. "He had heard," says Dr. Doddridge, "on the other side of the water, that it was currently reported among his companions at home that he was stark mad: a report at which no reader, who knows the wisdom of the world in these matters, will be much surprised, any more than himself. He concluded, therefore, that he should have many battles to fight, and was willing to despatch the business as fast as he could. And therefore being to spend a few days at the country house of a person of distinguished rank, with whom he had been very intimate, (whose name I do not remember that he told me, nor did I think it proper to inquire after it,) he begged the favour of him, that he would contrive matters so, that a day or two after he came down, several of their former gay companions might meet at his lordship's table; that he might have an opportunity of making his apology to them, and acquainting them with the nature and reasons of his change. It was accordingly agreed to; and a pretty large company met on the day appointed, with previous notice that Major Gardiner would be there. A good deal of raillery passed at dinner, to which the major made very little answer. But when the cloth was taken away, and the servants retired, he begged their patience for a few minutes, and then plainly and seriously told them what notions he entertained of virtue and religion, and on what consideration he had absolutely determined, that by the grace of God he would make it the care and business of his life, whatever censure and contempt he might incur. He well knew how improper it was in such company to relate the extraordinary manner in which he was awakened, which they would probably have interpreted to a demonstration of lunacy, against all the gravity and solidity of his discourse: but he contented himself with such a rational defence of a righteous, sober, and godly life, as he knew none of them could with any shadow of reason

contest. He then challenged them to propose any thing they could urge, to prove that a life of irreligion and debauchery was preferable to the fear, love, and worship of the eternal God, and a conduct agreeable to the precepts of his gospel. And he failed not to bear his testimony from his own experience (to one part of which many of them had been witnesses,) that after having run the wildest round of sensual pleasure, with all the advantages the best constitution and spirits could give him, he had never tasted any thing that deserved to be called happiness till he had made religion his refuge and his delight. He testified calmly and boldly the habitual serenity and peace that he now felt in his own breast (for the most elevated delights he did not think to plead, lest they should be esteemed enthusiasm) and the composure and pleasure with which he looked forward to objects which the gayest sinner must acknowledge to be equally unavoidable and dreadful.

"I know not what might be attempted by some of the company in answer to this; but I well remember he told me, the master of the table, a person of a very frank and candid disposition, cut short the debate, and said 'Come, let us call another cause: we thought this man mad, and he is in good earnest proving that we are so.' On the whole this well judged circumstance saved him a great deal of future trouble. When his former acquaintance observed that he was still conversable and innocently cheerful, and that he was immovable in his resolutions, they desisted from further importunity. And he has assured me, that instead of losing any one valuable friend by this change in his character, he found himself much more esteemed and regarded by many who could not persuade themselves to imitate his example."

Our limits will not permit us to enter into the detail of the life of this extraordinary man; it is sufficient to remark, that it was one undeviating course of holiness; that his religious views and feelings, though so remarkable, were proved to be the effect not of a blind enthusiasm, but of divine influence; and that the path he had deliberately chosen was most eminently, in the language of holy writ, "the path of the just, which shines more and more unto the perfect day."

On the 11th of July, 1726, he was married to the Right Honourable Lady Frances Erskine, daughter to the late Earl of Buchan, by whom he had thirteen children, five only of whom survived their father. On the 24th of January, 1730, he was advanced to the rank of lieutenant-colonel, in a regiment long under the command of Lord Cadogan, with whose friendship he was honoured for many years. And he continued in this rank and regiment till the 19th of April, 1743, when he received a

colonel's commission over a regiment of dragoons, at the head of which he valiantly fought in the defence of his sovereign and his country, in the year 1745, at the battle of Preston Pans, which was occasioned by the incursions of the rebels in favour of the Pretender.

On the morning of September 21 the army was alarmed at break of day by the noise of the rebel's approach, and the attack was made before sunrise, yet when it was light enough to discern what passed. As soon as the enemy came within gunshot they made a furious fire; and it is said that the dragoons which constituted the left wing immediately fled. The colonel at the beginning of the onset, which in the whole lasted but a few minutes, received a wound by a bullet in his left breast, which made him give a sudden spring in his saddle; upon which his servant, who had led the horse, would have persuaded him to retreat; but he said it was only a wound in the flesh, and fought on, though he presently after received a shot in his right thigh. The colonel was for a few moments supported by his men, but after a faint fire, the regiment in general was seized with a panic; and though their colonel and some other gallant officers did what they could to rally them once or twice, they at last took a precipitate flight. While thus unsupported by his men, a Highlander advanced towards Col. Gardiner with a scythe fastened to a long pole, with which he gave him such a deep wound on his right arm, that his sword dropped out of his hand; and at the same time several others coming about him, while he was thus dreadfully entangled with that cruel weapon, he was dragged off from his horse and received a blow in the head which soon proved mortal.

From the moment in which he fell it was no longer a battle, but a rout and carnage. The cruelties which the rebels (as it is generally said under the command of Lord Elcho) inflicted on some of the king's troops, after they had asked quarter, are dreadfully legible on the countenances of many who survived it. They entered Colonel Gardiner's house before he was carried off from the field; and notwithstanding the strict orders which the unhappy Duke of Perth (whose conduct is said to have been very humane in many instances) gave to the contrary, every thing of value was plundered, to the very curtains of the beds, and hangings of the rooms. His papers were all thrown into the wildest disorder, and his house made an hospital for the reception of those who were wounded in the action. Such was the close of a life which had been so zealously devoted to God, and filled up with so many honourable services. The remains of this christian hero were

interred the Tuesday following, September 24, at the parish church at Tranent, where he had usually attended divine service, with great solemnity.

"I conclude," says Dr. Doddridge, "with humbly acknowledging the wisdom and goodness of that awful Providence which drew so thick a gloom around him in the last hours of his life, that the lustre of his virtues might dart through it with a more vivid and observable ray. It is abundant matter of thankfulness that so signal a monument of grace, and ornament of the christian profession, was raised in our age and country, and spared for so many honourable and useful years. Nor can all the tenderness of the most affectionate friendship, while its sorrows bleed afresh in the view of so tragical a scene, prevent my adoring the gracious appointment of the great Lord of all events, that when the day in which he must have expired without an enemy appeared so very near, the last ebb of his generous blood should be poured out as a kind of sacred libation to the liberties of his country, and the honour of his God! that all the other virtues of his character, embalmed as it were by that precious stream, might diffuse around a more extensive fragrancy, and be transmitted to the most remote posterity, with that peculiar charm which they cannot but derive from their connexion with so gallant a fall: an event (as that blessed apostle, of whose spirit he so deeply drank, has expressed it) according to his earnest expectation, and his hope, that in him Christ might be glorified in all things, whether by his life or by his death."

## LORD NELSON.

Horatio Lord Viscount Nelson, one of the most distinguished commanders of the British navy, was born at Burnham Thorpe, Norfolk, September 29, 1758. His father, Edmund Nelson, was rector of that parish. Horatio received his education at the school of North Walsham, and discovered at an early age a strong predilection for the naval profession. Soon after he was taken from school he went to serve under his uncle, but as the latter commanded only a guard-ship in the Thames, he was sent in 1771 to the West Indies in a merchantman. He next sailed with Commodore Phipps, on a voyage of discovery towards the North Pole. Afterwards he engaged on board the squadron of Sir Edward Hughes, destined for the East Indies. Thence he returned, debilitated in body, and depressed in spirits. In 1780, having recovered strength enough again to brave death abroad, he was

appointed to serve in the West Indies, where his adventures were of the most romantic kind, but our limits will not permit the detail of them. A second time he returned to England a living skeleton, and went to Bath, where he was so helpless, that he was carried to and from his bed. Indeed Nelson was a great sufferer from his infancy; not having, like Charles XII. of Sweden, "a frame of adamant," yet like him having "a soul of fire," his frail body was perpetually harassed and wasted by the restless spirit within, that was impatient of confinement, and often on the eve of escaping. But from his bed of sickness, or rather on it, he was sent as a captain of the *Albemarle*, to suffer the rigours of a northern winter in the Baltic; and when he had undergone that seasoning he was ordered to Canada. Thence he passed to the West Indies, where he became acquainted with Prince William Henry, (late William IV.) then serving under Lord Hood: from that time the prince was a friend to him through life. In 1783, after a short visit to France, Nelson was a third time stationed in the West Indies, where he found himself senior captain, under Sir Edward Hughes, and consequently second in command. We must not enter into the details of his public spirited conduct in resisting the illegal practices of American interlopers and faithless government contractors. He served his country most daringly and disinterestedly; for which he was happy to escape ruin and a prison for life, instead of thanks and remuneration. Indeed from the very outset of Nelson's career to his last expedition, the ministers of government seem to have been always slow, and sometimes reluctant to reward his merits.

It was here, in 1787, he saw and loved, and married Mrs. Nisbet, the daughter of a physician in the island of Nevis. The purity and ardour of his attachment to this lady are glowingly displayed in his letters written to her during his occasional absence, and it is lamentable that the constancy of a passion so noble did not equal its intensity.

In the earlier period of the French revolutionary war, Nelson accompanied Lord Hood to Toulon, and was subsequently employed by that commander on an embassy to Naples, where he first saw Sir William and Lady Hamilton. Sir William, after his first interview with him, told his lady that he was about to introduce a little man to her who could not boast of being very handsome; but such a man as he believed would one day astonish the world. "I have never before," continued he, "entertained an officer at my house, but I am determined to bring him here; let him be put in the room prepared for Prince Augustus." Thus that acquaintance began which ended in the destruction of Nelson's

domestic happiness; though it seemed to threaten no such consequences in its commencement. He spoke of Lady Hamilton, in a letter to his wife, as a young woman of amiable manners, who did honour to the station to which she was raised.

We pass over the exploits of Nelson at Sardinia, Corsica, and on the coast of Italy, under Admiral Hotham; his labours there alone, if he had afterwards achieved no greater things, would have been sufficient to entitle him to rank among the first of British captains, though they were but the common-place incidents of his life. Amidst all disheartening, appalling, and obstructing contingencies, he pressed right onward in his course of honour.

In 1795 we find him, as Commodore Nelson, still in the Mediterranean with Sir John Jervis. In the battle of St. Vincent, from which the commander-in-chief derived his title of nobility, our hero distinguished himself by prodigies of enterprising valour. These revealed his name at once in the splendour which it had long been acquiring behind a cloud of untoward circumstances, and his country gazed on her proudest luminary, already at the meridian, with as much wonder as if it had been unknown, and had just arisen.

Nelson afterwards undertook the desperate expedition against Teneriffe. This was one of the few instances in which consummate skill and unconquerable spirit failed to accomplish his end. He returned to England with the loss of an eye, and of his right arm. Here he was invested with the Order of the Bath, and received a pension of £1000 a year.

Early in 1798 Nelson, now an admiral, rejoined Earl St. Vincent in the Mediterranean. When Buonaparte sailed with an immense armament from Toulon on an unknown expedition, Nelson was despatched in quest of him. Had these two men encountered, the recent history of Europe might have been different from what it is. Nelson's little fleet was dispersed by a storm, off the coast of Sardinia, which delayed the pursuit. His own ship, the *Vanguard*, was probably rescued from destruction in spite of himself, by Captain Ball, who resolutely took it in tow, and carried the admiral safe into Sardinia.

While he was refitting, he was reinforced by eleven ships of the line, and then, for the first time in his life, he found himself at the head of a magnificent armament, well appointed, worthy of its commander, and prepared for any service, however dreadful, to which he might lead it. Unfortunately his frigates had been separated in the storm, and could not afterwards rejoin the fleet. This was like the loss of his *eyes* to him, and his subsequent pursuit of the French to Egypt, back to Naples, and thence to

Egypt again, was a chase in the dark for want of these light and swift vessels to look out perpetually and on every hand for the enemy. That enemy at length he found in the port of Alexandria; and on the 1st of August a dreadful conflict ensued. Nelson found the French fleet moored in a strong line across the Bay of Aboukir, and in a position which the French admiral thought perfectly secure. He ordered an immediate attack, and by dexterously sending a part of his ships between the enemy's fleet and the shore, attacked it on both sides at once, ship after ship in succession. A complete victory was the consequence; nine ships of the line were taken, and two burnt; one of which was *L'Orient*, the French admiral's, who was killed in the engagement. However complete this victory was, Nelson could not pursue it, as he would have done, for want of means. Had he been provided with small craft, nothing could have prevented the destruction of the store-ships and transports in the port of Alexandria—four bomb-vessels would at that time have burnt the whole in a few hours. "Were I to die this moment," said he, in his despatches to the Admiralty, "*want of frigates* would be stamped on my heart. No words of mine can express what I have suffered, and am still suffering for the want of them." Such is the price which the hero must pay for the glory of inflicting death on his fellow-creatures, such comparatively small disappointments produce in his own mind inexpressible anguish. Nevertheless Nelson had achieved a great deliverance; not only Europe, but even India felt relieved from a burden of fear too horrible to be endured. The Grand Seignior, and the king of Naples, were the first monarchs to reward him with honours and endowments. At home he was created Baron Nelson of the Nile, and a pension of £2000 a year, for three lives, was conferred upon him. Meanwhile, at Naples, he tarnished the lustre of his victory in Egypt. He fell into the toils of Lady Hamilton; and equally intoxicated with passion and pride, acted unworthily, and even cruelly, as the executioner of Neapolitan vengeance on those subjects of the king, who had been compelled or seduced by French violence or craft, to violate their allegiance.

In 1800 Nelson returned to England, where he had every earthly blessing except domestic happiness; he had forfeited that for ever. Before he had been three months at home, he was separated from Lady Nelson. Some of his last words to her were, "I call God to witness, there is nothing in you or your conduct I wish otherwise." This was the consequence of his infatuated attachment to Lady Hamilton. It had before caused a quarrel with his son-in-law, and occasioned remonstrances from his true friends, which

produced no other effect than that of making him displeased with them, and more displeased with himself.

In the spring of 1801 he was appointed second in command to Sir Hyde Parker, over a fleet sent to the Baltic to chastise Denmark, Sweden, and Russia, for a coalition with France against the maritime rights of Great Britain. The fleet sailed on the 12th of March. Mr. Vansittart (now Lord Bexley) sailed in it; the British cabinet still hoping to obtain its end by negotiations. On the 21st Nelson had a long conference with Sir Hyde; and the next day addressed a letter to him, worthy of himself and of the occasion. Mr. Vansittart's report had been received. It represented the Danish government as in the highest degree hostile, and their state of preparation as exceeding what our cabinet had supposed possible; for Denmark had profited with all activity of the leisure which had so impoliticly been given her. More time was lost before it could be decided whether to take the passage of the Belt or of the Sound .At length orders were given to pass the Sound, and on the afternoon of the 29th the ships were cleared for action with an alacrity characteristic of British seamen. At daybreak on the 30th it blew a top-sail breeze from N.W. The signal was made, and the fleet moved in order for battle; Nelson's division in the van, Sir Hyde's in the centre, and Admiral Grave's in the rear. The whole force consisted of fifty-one sail, of various descriptions, of which sixteen were of the line.

The plan upon which Nelson had determined to act, if ever it should be his fortune to bring a Baltic fleet to action, was to attack the head of their line, and to confuse their movements —"Close with a Frenchman," he used to say, "but out-manœuvre a Russian." He offered his services for the attack, requiring ten sail of the line, and the whole of the smaller craft. Sir Hyde gave him two more line of battle-ships than he asked, and left every thing to his judgment. The enemy's force, which was very large, was not the only obstacle with which the British fleet had to contend, as the channel was extremely intricate, and little known. At five minutes after ten the action began. The first half of our fleet was engaged in about half an hour; and by half-past eleven the battle became general. The plan of attack had been complete; but seldom has any plan been more disconcerted by untoward accidents. Denmark had never been engaged in so arduous a conflict, and never did the Danes more nobly display their national courage; but between one and two their fire slackened, and about two it ceased from the greater part of their line. It was, however, difficult to take possession of those who struck, because the batteries protected them, and many of the boats which

approached for this purpose were fired upon. Hoping to save this unnecessary effusion of blood, Nelson wrote a spirited letter to the Crown Prince; in consequence of which a negotiation took place, which ended in the surrender of most of the enemy's fleet, and finally in a peace with Denmark.

His next expedition was not of his own choosing, nor in his own style. It was a sanguinary and disastrous attack on the French gun-boats at Boulogne, in which his usual skill and intrepidity were displayed, but without his customary success.

After the peace of Amiens, Nelson retired to a house which he had purchased at Merton, in Surrey, meaning to pass his days there with Sir William and Lady Hamilton. Sir William did not long survive.

On the renewal of hostilities, Nelson took the command of the blockading fleet off Toulon. On this station he continued more than two years, during which period he went on shore thrice only, each time on the king's business, and for not more than an hour.

In January 1805, the French fleet escaped out of Toulon, and joining the Spanish, sailed for the West Indies. Nelson was then at Sardinia, and though scarcely twenty-four hours behind them at the outset, so uncertain are operations at sea, that he pursued them in vain to Malta, to Barbary, through the Straits of Gibraltar, across the Atlantic, and back to Spain. From this unparalleled chace of more than seven thousand miles full speed, (after a stagnation of blockade for eight-and-twenty months,) Nelson returned to England in August worn out by fatigue, depressed by anxiety, and irritated by ill success. In the following year he once more left his native country to take the command of a fleet destined to achieve the greatest naval victory on record. He arrived off Cadiz on the 29th of September. For a long time he anxiously sought the enemy without effect; but on the 19th of October he received the gratifying intelligence that they had put to sea, and at day-break, on the 21st of October, the hostile fleets came in sight of each other in the vicinity of Cape Trafalgar. Our fleet consisted of twenty-seven sail of the line and four frigates; theirs of thirty-three, and seven large frigates. Their superiority was greater in size and weight of metal than in numbers.

Nelson, certain of a triumphant issue to the day, asked Captain Blackwood what he should consider as a victory. That officer answered, that, considering the handsome way in which battle was offered by the enemy, their apparent determination for a fair trial of strength, and the situation of the land, he thought it would be a glorious result if fourteen were captured. He replied, "I shall not be satisfied with less than twenty." Soon after the

signal was made; a signal which will be remembered as long as the language, or even the memory of England shall endure—Nelson's last signal—"England expects every man to do his duty!" It was received throughout the fleet with a shout of answering acclamation, made sublime by the spirit which it breathed, and the feeling which it expressed. In the midst of the action the *Victory* ran on board the *Redoutable* just as her tiller ropes were shot away. The French ship received her with a broadside; then instantly let down her lower deck ports, for fear of being boarded through them, and never afterwards fired a great gun during the action.

A ball fired from the mizen-top of the French vessel, which in the then situation of the two vessels was not more than fifteen yards from that part of the deck where he was standing, struck the epaulette on Nelson's left shoulder—about a quarter after one. Captain Hardy, who was a few steps from him, turning round saw three men raising him up. "They have done for me at last, Hardy," said he. "I hope not!" cried Hardy. "Yes," he replied, "my back-bone is shot through." Yet even now, not for a moment losing his presence of mind, he observed, as they were carrying him down the ladder, that the tiller ropes, which had been shot away, were not yet replaced; and ordered that new ones should be rove immediately—then, that he might not be known by the crew, he took out his handkerchief and covered his face and his stars. Had he but concealed those badges of honour from the enemy, England, perhaps, would not have had cause to receive with sorrow the news of the battle of Trafalgar.

It was soon perceived, upon examination, that the wound was mortal, and he became impatient to see Captain Hardy. When that officer, who had been often sent for, and who could not before leave the deck, at length came, they shook hands in silence, Hardy in vain struggling to suppress the feelings of that most painful moment. "Well, Hardy," said Nelson soon after, "how goes the day with us?"—"Very well," replied Hardy; "ten ships have struck."—"I am a dead man, Hardy," said he; "I am going fast—it will be all over with me soon." Captain Hardy then shook hands with him and was compelled to return upon deck. About fifty minutes after he returned, and again taking the hand of his dying friend and commander, congratulated him on having gained a complete victory. How many of the enemy were taken he did not know, as it was impossible to perceive them distinctly—but fourteen or fifteen at least. "That's well," cried Nelson; "but I bargained for twenty." And then in a stronger voice he said, "Anchor, Hardy, anchor." Hardy upon this hinted that Admiral Collingwood would take upon himself the direction of affairs.

"Not while I live," said the dying Nelson, endeavouring to raise himself from the bed: "do you anchor." His previous order for preparing to anchor had shown how clearly he saw the necessity of this. Presently calling Hardy back, he said to him in a low tone of voice, "Don't throw me overboard;" and he desired that he might be buried by his parents, unless it should please the king to order otherwise. Hardy stood over him in silence for a minute or two; then knelt again. "Who is that," said Nelson; and being informed, he replied, "God bless you, Hardy." Hardy then left him—for ever. His articulation now became difficult; but he was distinctly heard to say, "Thank God, I have done my duty!" These words he had repeatedly pronounced, and they were the last words which he uttered. He expired at thirty minutes after four—three hours and a quarter after he had received his wound.

It is almost superfluous to add, that all the honours which a grateful country could bestow were heaped upon the memory of Nelson. His brother was made an earl, with a grant of £6000 a year; £10,000 were voted to each of his sisters; and £100,000 for the purchase of an estate. A public funeral was decreed, and a public monument. Statues and monuments also were voted by most of our principal cities. The victory of Trafalgar was celebrated with the usual forms of rejoicing: but they were without joy; for such already was the glory of the British navy, that even this signal victory seemed forgotten in the consideration of the price by which it was purchased.

Nelson was a man of a most original and comprehensive genius; his energies, matured, experienced, concentrated, were incessantly directed to one point; and his amazing mind, inflamed by unbounded ambition, yet awed by a peculiar sense of religion, that rather haunted than governed him—exalted by enthusiastic patriotism—exasperated by remorseless hostility to France—rendered romantic by his insane attachment to Lady Hamilton—and latterly supported by the power and purse of the nation—at length accomplished all his heart's desire. With his death closed the most splendid era of the naval history of this country. It will be an age before there is *work* for another NELSON.

### LORD COLLINGWOOD

The character of this distinguished naval officer, though less marked by brilliant traits of genius than the preceding, yet from its consistency and solidity, as well as from the private and domestic virtues which adorned it, is scarcely less interesting. Cuthbert

Collingwood was the son of a very respectable descendant of the ancient family of the Collingwoods, in the north of England, whose names are connected with the traditions of border history. He was born at Newcastle-on-Tyne, September 26, 1750. In the year 1761, at the early age of eleven, he entered the navy, in the *Shannon,* under the care of his friend and relation, the late Admiral Braithwaite. In 1775, he was made a lieutenant by Admiral Graves, on the day that the battle was fought at Bunker's Hill, at which he was present. In 1776, he was on the Jamaica station, as lieutenant of the *Hornet* sloop, while Nelson, then of the same rank, was in the *Lowestoffe*, and on the same service. From a very early period a close intimacy subsisted between these distinguished officers; and it has been observed that, whenever Nelson obtained an advance in rank, he was quickly followed by Collingwood. The latter succeeded him, first in the *Lowestoffe*, then in the *Badger*, of which ship Collingwood was commander in 1779, and afterwards in the *Hinchinbroke*, which made them both post captains. The *Hinckinbroke* was, in the spring of 1780, employed on an expedition to the Spanish Main, from whence it was proposed to pass into the South Sea, by opening a navigable communication through the isthmus of Panama, along the river and the lakes Nicaragua and Leon. This plan was formed without a sufficient knowledge of the country, which presented difficulties not to be surmounted by human skill or perseverance. The climate was so unfavourable that the transports' men all died, and some of the ships, having none left to take care of them, sunk in the harbour.

From this scene he was relieved in August 1780, and in the following year was wrecked, in the *Pelican* frigate, on the Morant Keys, the ship's company escaping, with great difficulty, on rafts made of the small and broken yards. He then commanded the *Samson*, of sixty-four guns, and after the peace of 1783, was employed, with his friend Nelson, in suppressing the illicit traffic carried on by the citizens of the United States with the British West Indian Islands. Here he remained till the latter end of 1786, when, during an interval of repose, he visited his native county, Northumberland. From hence, in 1790, he was again recalled to the West Indies; but returning to England that same year, his services in that quarter being no longer necessary, he was married to Miss Sarah Blackett. By this lady he had two daughters, the elder of whom was born 1792, and the other in 1793. On the commencement of the French war, in the latter of these years, he was appointed flag-captain of the *Barfleur*. He was engaged

in the battle of the first of June, 1794, and though he did his duty nobly, was capriciously overlooked by Lord Howe, in the subsequent distribution of medals. Others, however, did him justice. Captain Pakenham took every occasion to say, "If Collingwood has not deserved a medal, neither have I, for we were together the whole day." He was subsequently appointed to the *Excellent*, and sailed to the Mediterranean. Here he again met with his old friend Nelson, in the command of the *Captain*, blockading Leghorn; both, however, soon appear to have been heartily sick of the wearisome, tantalizing, inglorious task of watching the French shut up in this and the other harbours of the Mediterranean.

But days more congenial with the feelings of the two gallant friends, succeeded to the dull and harassing system of blockade. Both had their share in the battle of the 14th of February, 1797, off Cape St. Vincent, in which Nelson performed feats of valour, and Collingwood was acknowledged by Lord St. Vincent, to have "contributed very much to the fortune of the day," particularly by relieving his old friend's ship the *Captain*, when engaged with two of the enemy's ships at a time. Nor was Nelson backward in acknowledging the services and gallant conduct of his friend on this occasion. Indeed, the conduct of the *Excellent* was the theme of praise from all quarters, which her commander appears to have received with feelings of gratitude, as well as with that becoming modesty which, through all his career, formed a marked feature in his character. The high spirit with which this temper was, however, combined, is well illustrated by the following circumstance, which took place at the memorable period now referred to. When Lord St. Vincent informed him that he was to receive one of the medals distributed on this occasion, he told the admiral, with great feeling and firmness, that he could not consent to receive a medal while that for the 1st of June was withheld. "I feel," said he, "that I was then improperly passed over, and to receive such a distinction now, would be to acknowledge the propriety of that injustice." "That is precisely the answer I expected from you, Captain Collingwood," was Lord St. Vincent's reply. Soon after this, the two medals were transmitted, at the same time, by Lord Spencer, with a civil apology for some delay in transmitting that for the 1st of June.

Towards the end of 1797, Captain Collingwood was again employed on the blockading system before Cadiz, in which harassing service, by the strictness of which the Spanish trade was ruined, he was continued till January 1799, when the *Excellent*, being

paid off, he was enabled once more to enjoy, for a few weeks, the society of his beloved family, in the north of England. But this repose was of very short duration, and in a few weeks, having been advanced to the rank of a rear-admiral, he was ordered to hoist his flag on board the *Triumph*. In the month of June, we find him with Lord Keith, in the Mediterranean. The tedious blockade of Brest which followed, was extremely harassing and irksome to all who were engaged in it, and the rigorous systems pursued, of keeping the ships out at all seasons, and preventing communication with each other, as well as all opportunity of corresponding with their friends at home, was no less injurious to the ships than to their crews, and became a general source of dissatisfaction throughout the fleet. In attachment to his profession, and in correct notions of discipline, no one could be more distinguished than Lord Collingwood. Yet we find him thus expressing his feelings in a letter to his father-in-law, dated from Torbay: "It is a great comfort to me, banished as I am from all that is dear to me, to learn that my beloved Sarah and her girls are well. Would to heaven it were peace! that I might come, and for the rest of my life be blessed in their affection. Indeed, this unremitting hard service is a great sacrifice, giving up all that is pleasurable to the soul, or soothing to the mind, and engaging in a constant contest with the elements, or with tempers and dispositions as boisterous and untractable. Great allowance should be made for us when we come on shore; for being long in the habits of absolute command, we grow impatient of contradiction, and are unfitted for the gentle intercourse of quiet life. I am really in great hopes that it will not be long before the experiment will be made upon me, for I think we shall soon have peace; and I assure you that I will endeavour to conduct myself with as much moderation as possible. I have come to another resolution, which is, when this war is happily terminated, to think no more of ships, but pass the rest of my days in the bosom of my family, where I think my prospects of happiness are equal to any man's."

The short interval of peace which occurred in 1802, enabled Lord Colliugwood to return once more to Morpeth, his family seat, and, for a brief season, to realize these affectionate anticipations in the society of his wife and daughters. "His amusements," says his relative and biographer, G. L. Newnham Collingwood, Esq. "were found in the intercourse with his family, in drawing, planting, and the cultivation of his garden, which was on the beautiful river Wansbeck. But," he continues, "while in cheerfulness and tranquillity, he was thus fully realizing those hopes of happiness which

he had so long entertained, hostilities with France recommenced; and in the spring of 1803 he was once more called away from his home, to which he never returned again." When, in May, he joined Admiral Cornwallis, off Brest, "Here comes Collingwood," said that fine old seaman, "the last to leave, and the first to rejoin me." His first ship at this period, was the *Venerable;* from her he shifted his flag to the *Culloden*, then to the *Dreadnought*, and lastly to the *Royal Sovereign*. It was in this ship that he bore so conspicuous a part in the battle of Trafalgar. That this battle would be fought, Lord Collingwood seems to have anticipated with a foresight almost prophetic, and during the previous manœuvres, he displayed a fine combination of gallantry and seamanship. With three sail of the line he blockaded Cadiz, and the combined fleets, numbering thirty-six; and when chased by sixteen, for the purpose of compelling him to enter the Straits of Gibraltar, he eluded all their efforts, though his own ship, the *Dreadnought*, was a very heavy sailer; when they tacked, he tacked after them; and when they crowded sail for Cadiz, he arrived off the harbour before half of them had got in, and with his three vessels resumed the blockade. The conduct and results of the great battle that followed have long been matters of history. Lord Collingwood was the second in command, and the first to begin the fight, which he did in the most able and gallant style.

Lord Nelson had made the *Royal Sovereign's* signal to pass through the enemy's line at the twelfth ship from the rear; but Admiral Collingwood observing her to be a two-decked ship, and that the second astern of her was a first-rate, deviated so far from the order as to proceed to the attack of this last, which carried Admiral Alava's flag. While they were running down, the well-known telegraphic signal was made, of "England expects every man to do his duty." When the admiral observed it first, he said that he wished Nelson would make no more signals, for they all understood what they were to do; but when the purport of it was communicated to him, he expressed great delight and admiration, and made it known to the officers and ship's company. Lord Nelson had been requested by Captain Blackwood (who was anxious for the preservation of so invaluable a life) to allow some other vessel to take the lead, and at last gave permission that the *Temeraire* should go ahead of him; but resolving to defeat the order which he had given, he crowded more sail on the *Victory*, and maintained his place. The *Royal Sovereign* was far in advance, when Lieutenant Clavell observed that the *Victory* was setting her studding sails, and with that spirit of honourable emulation which prevailed between the squadrons, and particularly between these

two ships, he pointed it out to Admiral Collingwood, and requested his permission to do the same. "The ships of our line," replied the admiral, "are not yet sufficiently up for us to do so now, but you may be getting ready." The studding sails and halliards were accordingly manned, and in about ten minutes the admiral, observing Lieutenant Clavell's eyes fixed upon him with a look of expectation, gave him a nod; on which that officer went to Captain Rotheram, and told him that the admiral desired him to make all sail. The order was then given to rig out, and hoist away, and in one instant the ship was under a crowd of sail, and went rapidly ahead. The admiral then directed the officers to see that all the men lay down on the decks, and were kept quiet. At this time the *Fougueux*, the ship astern of the *Santa Anna*, had closed up with the intention of preventing the *Royal Sovereign* from going through the line; and when Admiral Collingwood observed it, he desired Captain Rotheram to steer immediately for the Frenchman, and carry away his bowsprit. To avoid this, the *Fougueux* backed her main top-sail, and suffered the *Royal Sovereign* to pass, at the same time beginning her fire, when the admiral ordered a gun to be occasionally fired at her, to cover his ship with smoke. The nearest of the English ships was now distant about a mile from the *Royal Sovereign*; and it was at this time, while she was passing alone into the midst of the combined fleets, that Lord Nelson said to Captain Blackwood, "See how that noble fellow, Collingwood, takes his ship into action. How I envy him!" On the other hand, Admiral Collingwood, well knowing his commander and friend, observed, "What would Nelson give to be here!" and it was then, too, that Admiral Villeneuve, struck with the daring manner in which the leading ships of the English squadrons came down, despaired of the issue of the contest.

Admiral Collingwood's conduct in this battle was justly rewarded by his being raised to the peerage by the title of Baron Collingwood, of Caldbourne and Hethpoole, in the county of Northumberland. He also received the thanks of both houses of parliament, and the grant of a pension of £2000 for his own life; and, in the event of his death, £1000 per annum to Lady Collingwood, and £500 a year to each of his two daughters. But that which seems to have been most grateful to his feelings, was a letter written by order of the King, to the secretary of the Admiralty, expressing his Majesty's admiration and entire approbation of every part of his conduct. The letter concludes thus:—"The feeling manner in which he describes the events of that great day and those subsequent, and the modesty with which he speaks of himself, whilst he does

justice in terms so elegant and so ample to the meritorious exertions of the gallant officers and men under his command, have also proved extremely satisfactory to the king."

After the battle of Trafalgar, Lord Collingwood received a commission as commander-in-chief of the Mediterranean station, to the same extent as that which Lord Nelson had held. This formed an entire new era in his life, and no man could have filled the important station, or managed the various political transactions in which he was necessarily engaged, with more dignity, judgment, and good effect, than he did. In all these varied transactions, he showed himself a profound, and provident, and truly English-hearted statesman. Indeed, so satisfied were the ministry with all his proceedings, that he was kept on this station, contrary to his ardent desire to return to the bosom of his family, till he was fairly worn out with anxiety, fatigue, and disease, to which, at last, he fell a victim. He died at sea, the day after he had set sail on his return to England, March 7, 1810, a martyr to his high sense of professional duty. In his own words, "his life was his country's, and in her service it was sacrificed." It is observed by his biographer, that the length and hardships of his service are without any parallel; that, of fifty years nearly, during which he continued in the navy, about forty-four were passed in active employment, chiefly abroad; and that in the eventful period from 1793 till his death in 1810, he was only one year in England, the remainder of the time being principally employed in tedious blockades, rarely visiting a port; that on one occasion he actually kept the sea for the almost incredible space of twenty-two months, without once dropping anchor.

Lord Collingwood was an admirable disciplinarian; kind and considerate towards his officers and men, but vigilant and firm. When the mutiny at the Nore had spread an insurgent spirit throughout the navy, he zealously cooperated in the well-judged and decided measures by which Lord St. Vincent repressed that disastrous tendency in the Mediterranean fleet. He had a dislike, ever afterwards, to the employment of the word on common occasions; and when his officers made use of the term mutinous, in designation of casual acts of insubordination, he would reply, —"Mutiny, Sir! Mutiny in my ship! If it can have arrived at that, it must be my fault, and the fault of every one of my officers. It is a charge of the gravest nature, and it shall be most gravely inquired into." The conduct of this consummate commander towards his officers and men, exhibits a fine combination of the firm disciplinarian and the kind-hearted superintendent. He never unbent with the crew, but he uniformly disapproved of

all harsh, hasty, and discourteous expressions, even to the common sailors. He would admonish his officers on this point, in some such words as the following:—"If you do not know a man's name, call him 'Sailor,' and not 'You sir,' and such other appellations; they are offensive and improper." He uniformly reprobated unnecessary severity; and as he grew older, his dislike to corporal punishment increased. A year has even been known to elapse, in his ship, without its infliction: he substituted privation and extra work, contriving to expose the offender to the ridicule of his shipmates, and to place him in circumstances of inconvenience and restraint, without bodily pain or positive degradation. In sickness, the men received from him the kindest treatment: he visited them daily, supplied them from his own table, and when they were convalescent, had them put under the care of the lieutenant of the morning watch, and brought to himself every day for personal inspection. No wonder that a man like this was beloved by his crew, nor that they wept for his departure when he changed his ship, nor that he could depend upon their good will when other vessels were nearly in a state of insurrection. At the dark and menacing season to which we have already alluded, while capital punishments were frequently resorted to in the other vessels of Lord St. Vincent's fleet, Captain Collingwood's ship was kept in order, almost without any corporal infliction whatsoever. So highly did that distinguished commander think of his character as a disciplinarian, that he would frequently order the most refractory to be drifted into the *Excellent*.—"Send them to Collingwood," he would say, "and he will bring them to order."

Lord Collingwood has been distinguished as "a perfect example for an English sailor;" affording at the same time "a memorable illustration, how, in every noble heart, humanity and gentleness are the inseparable companions of true valour." It is delightful to contemplate in his lordship's beautiful letters to his family, the freshness and purity of the domestic affection, as existing in the breast of the stern son of ocean and war, and to observe the tenderness with which his mind was perpetually turning to the home which he was destined never to revisit. All the world knew that Lord Collingwood was an excellent officer, whose services had been eminently conducive to the safety and glory of the British nation. But it was not till the publication of the biography to which we are indebted for most of the above incidents, that his character could be fully appreciated, as an accomplished gentleman, a most mild and benevolent man, and, in short, one of the brightest ornaments of his country, as well as of the profession to which he belonged. The remains of his lord-

ship were conveyed to England, and deposited by the side of his friend, Lord Nelson, in St. Paul's cathedral, where a monument was also erected, by vote of parliament, to his memory.—See Public and Private Correspondence of Vice-Admiral Lord Collingwood, with Memoirs of his Life, by G. L. Newnham Collingwood, Esq.

## Section III.—Poets and Men of Literature.

### DR. JOHNSON.

Dr. Samuel Johnson, one of the most celebrated English writers, was born at Lichfield, in Staffordshire, September 18, 1709. His father, Michael Johnson, was a bookseller, and more than once bore the office of magistrate in the city. Johnson inherited from his father a morbid melancholy, which accompanied him through life, and a tinge of scrofula, which disfigured a face naturally well formed, and deprived him of the sight of one of his eyes.

When arrived at a proper age, he was placed in the free school of Lichfield, of which Mr. Hunter was then master; a man whom his pupil thought "wrong-headedly severe," but a skilful teacher. At the age of fifteen Johnson was sent to the school of Stourbridge, in Worcestershire. On his return home, he read a great deal in a desultory manner, so that, when in his nineteenth year he was entered a commoner of Pembroke College, Oxford, his mind was stored with a variety of such knowledge as is not often acquired in universities. His father being unable to support him at college, complied with the proposal of Mr. Corbet, of maintaining Samuel at Oxford, as companion to his son. Johnson was careless of his character, with respect to the discipline and studies of the place, yet he obtained credit by some of his compositions, of which the most distinguished was a translation into Latin of Pope's Messiah. In the year 1731 he was obliged, by poverty, to leave the university without a degree; and his father, who died a few months afterwards, left him destitute of the means of subsistence. In March, 1732, he accepted an invitation to the office of undermaster of a free school, at Market Bosworth, in Leicestershire; but being disgusted with the treatment which he received from the patron of the school, he relinquished, in a few months, a situation which he ever afterwards recollected with horror.

He was soon after invited by a Mr. Hector, who had been his school-fellow, and was his intimate friend, to pass some time with him at Birmingham, as his guest, at the house of Mr. Warren, with whom Mr. Hector then resided. Mr. Warren was the first established bookseller in Birmingham, and was very attentive to Johnson, who, he soon found, could be of much service to him in his trade, by his knowledge of literature; and he even obtained the assistance of his pen in furnishing some numbers of a periodical essay, printed in the newspaper of which Warren was proprietor. He continued to live as Mr. Hector's guest for about six months, and then hired lodgings in another part of the town. He made some valuable acquaintances there, amongst whom were Mr. Porter, a mercer, whose widow he afterwards married; and Mr. Taylor, who by his ingenuity in mechanical inventions, and his success in trade, acquired a large fortune. But the advantage of being near his friend Hector is said to have been his chief inducement for continuing here. During his stay at Birmingham, he translated from the French Lobo's Voyage to Abyssinia, which was published in one volume, octavo, in 1735, and for which he received from the bookseller five guineas.

Before this book was printed, Johnson returned to Lichfield, and there published "Proposals for Printing the Latin Poems of Politian, with notes, and the Life of Politian, &c." in one volume, at the price of five shillings, in sheets; but he did not meet with a sufficient number of subscribers to encourage him to proceed in his design. In 1735 he married, and soon after set up a private academy; for which purpose he hired a large house, well situate near his native city. In the Gentleman's Magazine for 1736 is the following advertisement:—"At Edial, near Lichfield, in Staffordshire, young gentlemen are boarded and taught the Latin and Greek languages, by Samuel Johnson." But the only pupils that were put under his care were the celebrated David Garrick and his brother George, and a young gentleman of fortune of the name of Offely, who died early. Meeting with so little encouragement in his academy, he came up to London in March 1737, in company with Garrick, who then intended to follow the profession of the law, from which he was soon diverted by his strong propensity to the stage. Johnson was recommended by his friend Gilbert Walmsley, registrar of the prerogative court of Lichfield, to Mr. Colson, an eminent mathematician, and master of an academy, in a letter, wherein is the following passage: "Davy Garrick is to be with you early the next week; and Mr. Johnson, to try his fate with a tragedy, and to see to get himself employed in some translation, either from the Latin or the French.

Johnson is a very good scholar and poet, and I have great hopes will turn out a fine tragedy writer."

His first patron in London was Edward Cave, the printer of the Gentleman's Magazine; and his contributions to that work became for many years his principal resource for employment and support. Soon after his arrival in London, he finished his tragedy of Irene, and endeavoured to get it brought upon the stage, but he had not sufficient interest for that purpose; and it was not acted till 1749, when his friend David Garrick was manager of Drury Lane Theatre. In 1738 he published his "London," a poem in imitation of the third satire of Juvenal. This gained him some reputation, and excited the attention of Pope; but the difficulties which he met with in London occasioned him, in 1739, to be desirous of being chosen master of a country free school, the salary of which was sixty pounds a year. This humble situation, however, he could not attain. It was necessary that he should be a master of arts; and Lord Gower was prevailed upon to write a letter in his favour to a friend of Dean Swift's, in order to induce him to use his interest with Swift, to procure the degree of master of arts for Johnson from Trinity College, Dublin. But this application was unsuccessful; and there is much reason to believe that this was the source of that dislike to Swift which Johnson afterwards manifested, both in his conversation and in his writings.

In 1739 he published a complete "Vindication of the Licensers of the Stage," from the malicious and scandalous aspersion of Mr. Brooke, author of Gustavus Vasa. This was an ironical, but a very proper attack, upon the Lord Chamberlain, for the unjustifiable suppression of that tragedy. The same year he published "Marmor Norfolciense; or, an Essay on an Ancient Prophetical Inscription, in Monkish Rhyme, lately discovered near Lynn, in Norfolk, by Probus Britannicus." In this performance, he in a feigned inscription, supposed to have been found in Norfolk, the county of Sir Robert Walpole, inveighs against the Brunswick succession, and the measures of government consequent upon it. To this supposed prophecy he added a commentary very unfavourable to the family upon the throne.

Johnson also published "Proposals for Printing the History of the Council of Trent, translated from the Italian of Father Paul Sarpi; with the Author's Life, and Notes, Theological, Historical, and Critical, from the French edition of Dr. le Courayer." Some sheets of this were printed in quarto, by Cave, but the work was never finished. In 1774 he published, in octavo, his "Life of Richard Savage;" and the same year he wrote the

preface to the "Harleian Miscellany." The following year he published a pamphlet, entitled "Miscellaneous Observations on the Tragedy of Macbeth, with Remarks on Sir Thomas Hanmer's Edition of Shakspeare;" to which he affixed Proposals for a new edition of that poet. In 1747 he published, in octavo, the "Plan of his Dictionary of the English Language," which he addressed to the Earl of Chesterfield, then secretary of state. The booksellers who contracted with Johnson for the execution of this work were Mr. Robert Dodsley, Mr. Charles Hitch, Mr. Andrew Millar, the two Messrs. Longman, and the two Messrs. Knapton. The price stipulated was £1,575. Lord Chesterfield affected to patronize the work, but rendered so little service to Johnson of any kind, that he afterwards expressed himself of his pretended patron in terms not a little contemptuous.

In 1749 he published "The Vanity of Human Wishes," in imitation of the tenth satire of Juvenal. Mr. Boswell says, that the "Vanity of Human Wishes" is, in the opinion of the best judges, as high an effort of ethic poetry as any language can show. The instances of variety of disappointment are chosen so judiciously, and painted so strongly, that the moment they are read, they bring conviction to every thinking mind. The same year his tragedy of Irene was performed at Drury Lane Theatre: by the favour of Garrick it was acted nine nights, but it was not received with any great degree of applause.

In 1750 Dr. Johnson began to publish his "Rambler," in periodical numbers, and it was concluded in 1752. It is observed by the author of the "Essay on the Life, Character, and Writings of Dr. Samuel Johnson," that "it is to this admirable performance that he owes much of his reputation. It was not, however, on its first publication, very popular, nor very generally read. But the great merit of this work was at length acknowledged. It has since passed through many editions, and been translated into foreign languages. In the 'Rambler' indeed, the finest sentiments of morality and of piety are rendered delightful by the harmony and splendour of the language. In his 'Lives of the Poets,' as well as in some of his other works, there are no inconsiderable number of exceptionable passages, but his 'Ramblers' are almost uniformly entitled to applause. The morality inculcated is pure, and the piety in general is rational; and the criticisms and observations on life and manners are acute and instructive. It is one of those works which may repeatedly be read, and which will repeatedly delight."

In 1755 the university of Oxford conferred on Johnson the

degree of master of arts by diploma; and the same year he published, in two volumes, folio, his "Dictionary of the English Language;" and the following year he published an abridgement of it, in two volumes, octavo. He afterwards occasionally employed himself in writing for magazines, and other periodical publications. In 1758 he published his "History of Rasselas, Prince of Abyssinia."

In 1762 he received a pension from the king of £300 a year, which was continued to the end of his life. In 1765 the degree of doctor of laws was conferred on him by Trinity College, Dublin; and he received, some years after, the same degree from the university of Oxford. In 1765 he published his edition of Shakspeare; and this year he was introduced into the family of Mr. Thrale, an eminent and wealthy brewer, and member of parliament for the borough of Southwark. Mr. Boswell remarks, that "nothing could be more fortunate for Johnson than this connexion. He had at Mr. Thrale's all the comforts and even luxuries of life; his melancholy was diverted, and his irregular habits lessened by an association with an agreeable and well-ordered family. He was treated with the utmost respect, and even affection. The vivacity of Mr. Thrale's literary talk roused him to cheerfulness and exertion, even when they were alone. But this was not often the case, for he found here a constant succession of what gave him the highest enjoyment; the society of the learned, the witty, and the eminent in every way, who were assembled in numerous companies, called forth his wonderful powers, and gratified him with admiration, to which no man could be insensible." In 1767 he had a private interview with the king, in the library at the Queen's Palace. In 1770 he published his "False Alarm;" the following year, "Thoughts concerning Falkland's Islands;" and in 1774, "The Patriot." These political pamphlets have great merit in point of language; but they contain much gross misrepresentation, and much malignity, and abound with such arbitrary principles as are totally inconsistent with a free constitution.

In the autumn of the year 1773 he undertook a journey to the Hebrides, or Western Islands of Scotland, of which he published an account, in one volume, octavo, in 1775. Dr. Towers observes, that "this is a very masterly performance; for, besides a very pleasing account of his journey, it also contains a variety of acute observations on human life, and many curious incidental remarks relative to the history of literature, with which Dr. Johnson was very intimately conversant. In this journey he was accompanied by Mr. Boswell; and the habitual good humour of

this gentleman, his vivacity, his love of literature, and his personal attachment to Johnson, together with his natural influence in Scotland, must have rendered him a very agreeable companion to him during the course of his tour to the Hebrides. Of this journey Mr. Boswell has himself since published an account, which is highly entertaining, and which appears to contain a very natural, exact, and faithful representation, not only of the incidents which occurred during the tour, but also of the singular manners of his learned and celebrated friend."

In 1775 he travelled into France, with Mr. and Mrs. Thrale; and Foote, who happened to be at Paris at the same time, said, that the French were quite astonished at his figure and manner, and at his dress, which was exactly the same with what he was accustomed to wear in London. It was this year that he published his "Taxation no Tyranny; an Answer to the Resolutions and Address of the American Congress." This pamphlet contained the same arbitrary principles with his former political pieces, and the grossest and most virulent abuse of the Americans.

In 1779, when he was seventy years of age, he published his "Lives of the Poets." These considered as compositions, possess a very high degree of merit, and contain a great variety of acute and admirable reflections; but they are often very far from containing just, candid, or impartial accounts concerning whom he wrote. Bishop Newton says, "Never was any biographer more sparing of his praises, or more abundant in his censures. He seemingly delights more in exposing blemishes than in recommending beauties: slightly passes over excellences, and enlarges upon imperfections."

Dr. Johnson died at his house in Bolt Court, Fleet Street, on the 13th of September, 1784, in the 75th year of his age, and was interred in Westminster Abbey. The following character has been given of him by Mr. Boswell in his journal of their tour to the Hebrides: "Dr. Samuel Johnson's character, religious, moral, political, and literary, nay, his figure and manner, are, I believe, more generally known than those of almost any man; yet it may not be surperfluous here to attempt a sketch of him. Let my readers then remember that he was a sincere and zealous Christian of the high church of England, and monarchical principles, which he would not tamely suffer to be questioned; steady and inflexible in maintaining the obligations of piety and virtue, both from a regard to the order of society, and from a veneration to the great source of all order; correct, nay stern in his taste; hard to please, and easily offended; impetuous and irritable in his temper, but of a most humane and benevolent heart; having a

mind stored with a vast and various collection of learning and knowledge, which he communicated with peculiar perspicuity and force, in rich and choice expression. He united a most logical head with a most fertile imagination, which gave him an extraordinary advantage in arguing; for he could reason close or wide, as he saw best for the moment. He could, when he chose it, be the greatest sophist that ever wielded a weapon in the schools of declamation; but he indulged this only in conversation, for he owned he sometimes talked for victory: he was too conscientious to make error permanent and pernicious by deliberately writing it."

The works of Dr. Johnson were published together in eleven vols. 8vo, in 1787, and two additional volumes have since been added. Two vols. 8vo, of letters have also been published by Mrs. Piozzi.

## COWPER.

This eminent christian poet, was born at Berkhamstead, in Hertfordshire, November 26, 1731. His father, Dr. John Cowper, was chaplain to King George II. and nephew to Lord Chancellor Cowper. His mother was the daughter of Roger Donne, Esq., and a woman of exemplary character and extraordinary merit. Her death, which happened when Cowper was about six years old, seems to have made a deep and mournful impression on his tender and delicate mind; so much so, that the recollection of it nearly fifty years afterwards, being awakened by the receipt of her portrait, drew from him a poem which is justly regarded as one of the most beautiful and pathetic compositions in existence. At six years old he was sent to a considerable school at Market Street, in Hertfordshire, where he suffered much from hardships of various kinds, for which he was but ill prepared, by his natural delicacy of constitution, as well as the timidity of his mind, and the great tenderness with which he had till then been treated. Being afflicted with a weakness and inflammation in his eyes, he was placed for some time under the care of an eminent oculist in London, and was afterwards sent to Westminster school. The acuteness of his feelings, and the unsuitableness of this scene to his peculiar character, rendered those years which might have produced a series of enjoyment, miserable years of increasing timidity and depression.

At the age of eighteen he left Westminster, where he had acquired the accomplishments and reputation of scholarship, as well as the esteem of some aspiring youths, who afterwards rose to eminence. He was now placed with an attorney for three years; a situation

very irksome to his feelings, and which promoted his constitutional tendency to melancholy. At the expiration of this term, he became, as he informs us, in a short memoir written by himself, his own master, and took chambers in the Inner Temple. But he had not been long here before he was struck with a deep dejection of mind, which at once disinclined and unfitted him for any kind of application. He searched in vain for any thing that would interest or amuse him, till he met with Herbert's Poems: the strain of piety which pervaded them, and which he so much admired, seemed for a time to alleviate his malady; but he continued in a wretched state of mind for nearly a twelvemonth; when he says, having proved the inefficacy of all human means, he began to think seriously of religion, and from this source obtained a degree of calmness of mind to which he had long been a stranger. He soon after, however, banished all thoughts of God and religion, and indulged his appetites for amusement, till at length his conscience became silent, except that it would sometimes suggest a doubt of the safety of persisting in a course so contrary to the dictates of the gospel.

The natural diffidence and despondency of his mind having precluded the hope that Cowper would rise to eminence in his profession, his friends turned their attention to some other means of obtaining a comfortable income, and proposed his becoming candidate for the offices of reading clerk, and clerk of the private committees in the house of lords; but the idea of reading in public was such a terror to him, that he declined accepting this offer, and was appointed clerk of the journals, as the business of that office was transacted privately. But a parliamentary dispute rendering it necessary for him to appear at the bar of the house, in order to entitle himself publicly to the office, all his terrors and despondency returned, and he felt convinced that on these terms he could never gain the office; yet the interest of his friends who had introduced him, his own reputation, and his reduced circumstances, urged him to undertake what he saw to be impracticable. Speaking of the miserable state of his mind at this period, he says, "Those whose spirits are formed like mine, to whom a public exhibition of themselves is mortal poison, may have some idea of the horrors of my situation: others can have none." His perpetual distress brought on a nervous fever, which rendered change of scene necessary, and he repaired to Margate, where he somewhat recovered his spirits, by turning away his thoughts from the ensuing crisis. On his return, however, to business, all his terrors increased, and all the pains he could take to prepare himself for the situation, were rendered useless by the persuasion of his own mind, that whatever knowledge he might acquire, it would forsake him at the

bar of the house. The anguish of his mind rapidly increased as the time approached, and he could only comfort himself with the hope that he should, from all appearance, before the day appointed, lose his senses; but as day after day, and week after week, they were still preserved, he began to direct his attention to that most awful and mistaken method of escaping the difficulties of life, self-murder. At this period he met with several circumstances which had a tendency to lessen the crime of suicide in his estimation, but his resolution was soon fixed. The scenes which followed are too dreadful for description; it is sufficient to say, that he made several attempts to execute his horrid purpose, which were by various providential circumstances rendered ineffectual, but which of course unfitted him for appearing in the house, and his claims to the office were entirely resigned. Mr. Cowper says of himself, that he now, for the first time, earnestly sought to become acquainted with the great truths of religion; but despondency had seized so fast hold of his mind, that he could view only the enormity of his crimes, and the condemnation which he concluded they must bring upon him; it was in vain that his brother (to whom he had written on account of his distress) endeavoured to turn his thoughts towards the mercy of God, as it is displayed in the gospel dispensation. By means of frequent conversations with his esteemed friend, Mr. Maden, he however obtained for a time some degree of calmness; but the mental disorder to which he was constitutionally prone, seized him in a short time, and it was found necessary to place him under the care of Dr. Cotton, at St. Alban's. On this part of his history Mr. Hayley very justly observes: "The misfortune of mental derangement is a topic of such awful delicacy, that I consider it is the duty of a biographer rather to sink in tender silence, than to proclaim, with circumstantial and offensive temerity, the minute particulars of a calamity to which all human beings are exposed, and perhaps in proportion as they have received from nature those delightful and dangerous gifts, a heart of exquisite tenderness and a mind of creative energy."

From December 1763, to the following July, this amiable man suffered all the wretchedness attendant on his disorder. At that time his health being much improved by means of the medical skill of Dr. Cotton, his views of religion became less gloomy, till at length he ventured to read some parts of the Bible, and there saw so much benevolence and mercy of the Saviour, that he wept with pleasure, while he said to himself, "Still there is mercy." His physician and friends perceived the alteration, and were apprehensive lest the sudden transition from pain to joy should be too much for his weak frame. In a short time, however, they were

satisfied of the soundness of his cure, and Cowper wishing to reside near his brother, who was a fellow of Bene't College, Cambridge, relinquished all thoughts of engaging in the pursuits of business, and retired to Huntingdon. Here he at first felt rather lonely, as he had no friend nearer than Cambridge, a distance of sixteen miles; but so completely was the tone of his mind altered, that he experienced a degree of joy and satisfaction in the consolations which religion affords, which kept him in a constant spirit of tranquillity and gratitude.

In the course of a few months a young man named Unwin, who had frequently watched Cowper with much interest, determined to become acquainted with him, and Cowper was by this means introduced into a family circle very congenial to his taste; and as they were much delighted with his society, their mutual esteem led to his becoming an inmate in the family; and from them he received all the kind attention which friendship and affection could dictate. In 1767 Mr. Unwin, the father, was killed by a fall from his horse, and Cowper removed with the widow to Olney. Here he contracted a close friendship with the late Mr. Newton, then rector of the parish, and afterwards for many years rector of St. Mary Woolnoth, London; an excellent man, whose religious opinions harmonized with his own. When Mr. Newton published his volume of Hymns, called "The Olney Collection," it was enriched with many compositions from the pen of Cowper, which bear internal evidence of a cultivated understanding, and an original genius. His time was now dedicated to literary leisure, in which the mind, left to its own operations, follows up that line of pursuit which is the most congenial to its taste, and the most adapted to its powers. In his garden, in his library, and in his daily walks, he seems to have disciplined his muse to the picturesque and vivid habits of description, which will always distinguish Cowper among our national poets. In 1768 he was visited by a heavy affliction, in the illness and death of his brother, for whom he possessed the highest esteem and affection. Cowper hastened to Cambridge on the first news of his illness, and the scenes which passed between these two affectionate brothers are beautifully described in a narrative he was induced to write, and which Mr. Newton published in 1802.

After residing for three or four years at Olney, Cowper's mind sunk into severe paroxysms of despondency, which continued for several years. Mrs, Unwin was his constant and faithful attendant, and at length received the reward of her maternal assiduity, in seeing the fine and powerful mind of Cowper gradually recover its capacity for enjoyment and exertion. His first amusement was that of educating a group of tame hares, of whom he has given a minute and

admirable description in prose, which was published in the second volume of his poems. Mr. Newton being about to remove from Olney to an enlarged sphere of usefulness in London, kindly introduced Mr. Bull of Newport Pagnell to the acquaintance of Cowper, that he might not be left without a friend in the neighbourhood. In 1781 our poet first published a volume containing many poems of extraordinary merit, but which are now so well known that it is needless to give any particular description of them; it is sufficient to say, that they were not less admirable for wit and humour, than for pathos and sublimity. In the following winter, as the poet was sitting with his friends, Mrs. Unwin and Lady Ann Austin, who then resided with them, Lady Austin perceiving him much depressed told him the story of John Gilpin, for the sake of diversion; the tale so much took his fancy, that during the night he turned it into the humorous ballad which is so justly and generally admired. To the same lady the public are indebted for the origin of the Task, the masterpiece of Cowper's poetic talents. Being an admirer of Milton's blank verse, Lady Austin had often requested the poet to write in that measure; and he at length said, "If you will give me a subject, I will." "You can be at no loss for that," was the reply; "write on this sofa." He did so, and expanded the poem till it embraced almost every subject of importance. This, with his Tirocinium, and several miscellaneous pieces, formed his second volume, which was published in 1784. About two years afterwards he removed with Mrs. Unwin from Olney, to the pleasant village of Weston; a change which added greatly to his comfort, and much improved his health. He had not been long here before he was accidentally introduced to the acquaintance of Mr. Hayley, afterwards his excellent and admired biographer. In the following summer he was with much difficulty persuaded to pay a visit to Eartham, the residence of Mr. Hayley, who seized this opportunity of engaging Romney, an eminent artist, to take his portrait.

Soon after his return to Weston his health began to decline; and the constant sight of his endeared companion, Mrs. Unwin, who had been reduced by two paralytic strokes to a melancholy state of bodily and mental imbecility, added to the diminution of his small fortune, preyed on his tender spirits, and brought on his mental disorder. His cousin, Lady Hesketh, devoted her time and abilities entirely to his comfort; and his kinsman, Mr. Johnson, exerted himself for his amusement, but in vain. In 1794, a pension from his majesty was granted him, which would have relieved the poet's mind from all anxiety on account of his circumstances; but his malady deprived him of all power of

receiving comfort. As the last hope of his friends, his removal to the sea-coast of Norfolk was proposed, and Mr. Johnson kindly undertook the charge of the two sufferers. By the constant efforts of Mr. Johnson, who took a house in the neighbourhood of Dereham for the winter, he was sometimes diverted, and was even induced to attempt the correction of his translation of Homer's Iliad, which he had undertaken a few years before, as well as that of the Odyssey. But this was only a temporary revival; in a few months he again sunk into the most pitiable melancholy. In December, 1796, Mrs. Unwin, whose powers had been gradually wasting, expired without a struggle. Cowper was much distressed at taking his leave of the corpse, but never mentioned the name of his friend again. In the course of the following year his disorder was in a measure mitigated, by frequent visits to the sea-side; he revised his translation of Homer's Odyssey, and wrote some small original pieces. In the latter end of March, 1799, he wrote some stanzas, entitled the "Castaway," founded on an anecdote in Anson's Voyages.

He afterwards became too ill to attend to any employment; and on the 13th of April, 1800, alarming symptoms appeared. On the 13th, Mr. Johnson, fearing his death might be near, ventured to speak of his approaching dissolution, as a signal of his deliverance from his bodily and mental sufferings. After a pause of a few moments, which was less interrupted by the objections of his desponding friend than he expected, he added a consideration still more consolatory; namely, that in the world to which he was hastening, a merciful Redeemer had prepared unspeakable happiness for all his children, and therefore for him. To the first part of this sentence he listened with tolerable composure; but the concluding words were no sooner uttered, than his passionately expressed entreaties that his companion would desist from any further observations of the kind, clearly proved, that though he was on the eve of being invested with angelic light, the darkness of delusion still veiled his spirit. From this mournful period, till the features of his deceased friend were closed from his view, the expression which his kinsman observed in them, and which he delighted to suppose an index of the last thoughts and enjoyments of his soul, was that of calmness and composure, mingled with holy surprise. On the 25th a deadly change was observed to have taken place, and after remaining for twelve hours in an insensible state, he ceased to breathe. In so mild and gentle a manner did his spirit take its flight, that the moment of its departure was unobserved, even by those friends whose eyes were fixed on his dying countenance.

"The person and life of Cowper," says Mr. Hayley, "seem to have been formed with equal kindness by nature; and it may be questioned, if she ever bestowed on any man, with a fonder prodigality, all the requisites to conciliate affection and to inspire respect. He was beloved and revered by all who knew him, with a sort of idolatry. I may be suspected of speaking with fond partiality the unperceived exaggerations of friendship; but the fear of such a censure shall not deter me from bearing my most deliberate testimony to the excellency of him whose memory I revere, and saying, that as a man he made, of all men whom I ever had opportunities to observe so minutely, the nearest approaches to moral perfection." Lord Thurlow has expressed the same idea of his character; for being once requested to describe him, he replied, with that solemn air of dignified elocution by which he was accustomed to give a very forcible effect to a few simple words, "Cowper is truly a good man."

## SIR WALTER SCOTT.

Sir Walter Scott, our most eminent novelist, and often designated as the Great Magician of the North, was born at Edinburgh, May 15, 1771. He was the third son of Walter Scott, Esq., writer to the signet, by Anne, daughter of Dr. John Rutherford, professor of the practice of medicine in the university of Edinburgh. The first seminary which he attended was one for English and other ordinary branches of education, kept by a Mr. Leechman, in Hamilton's Entry, Bristo Street. He entered Fraser's class at the High School in the third year; that is to say, when that master had carried his class through one half of the ordinary curriculum of the school. After two years of instruction under Mr. Fraser, young Scott, in October 1781, entered the rector's class, then taught by Dr. Alexander Adam. As a school-boy he was by no means remarkable for proficiency. In his exercises there was much blundering and incorrectness; and there is his own authority for saying, that even in the exercise of metrical translation he fell far short of some of his companions. The future author of Waverley left the High School in 1783, ranking only eleventh in the Rector's class. It is the tradition of the family that our poet wished at this period of his life to become a soldier. An illness, however, which had beset his early years, rendered this wish bootless, even although his parents had been inclined to gratify it. His malady had had the effect of contracting his right leg, so that he could hardly walk erect, even with the toes of that foot upon the ground.

After having been two years under the rector of the High School, he was placed in the university of Edinburgh, October 1783. He was matriculated in that year, at once, for the Humanity or Latin class under Professor Hill, and the Greek class under Professor Dalzell; and for the latter, once more in 1784. But the only other class for which he seems to have matriculated at the college was that of logic, under Professor Bruce, in 1785. While still at the High School, he made his first attempt in original versification, the subject being a thunder storm, which happened one day as he and his companions were amusing themselves in the yard. "When boyhood advancing into youth," as he says in an autobiographical sketch, "required more serious studies and graver cares, a long illness threw me back on the kingdom of fiction, as if it were by a species of fatality." About his sixteenth year Walter's health experienced a sudden but most decisive change for the better. Though his lameness remained the same, his body became tall and robust, and he was thus enabled to apply himself with the necessary degree of energy for his studies for the bar. At the same time that he attended the lectures of Professor Dick on civil law in the college, he performed the duties of a writer's apprentice under his father. On the 10th of July, 1792, when on the point of completing his twenty-first year, he passed advocate with the usual forms. The young barrister was enabled, by the affluence of his father, to begin life in an elegant house in a fashionable part of the town; but it was not his lot to acquire either wealth or distinction at the bar.

In the beginning of the year 1797, it was judged necessary by the gentlemen of Mid-Lothian to imitate the example already set by several counties, by embodying themselves in a cavalry corps. This association assumed the name of the Royal Mid-Lothian regiment of Cavalry; and Mr. Scott was appointed its adjutant, for which office his lameness was considered no disqualification, especially as he happened to be a remarkable graceful equestrian. He became a signally zealous officer, and very popular in the regiment, on account of his extreme good humour and powers of social entertainment. In December 1797, the poet married Miss Margaret Charlotte Carpenter, daughter of the deceased John Carpenter, Esq. of the city of Lyons. The young lady had some fortune. After a protracted correspondence with Lord Downshire, her guardian, the match was concluded upon, and carried into effect at Carlisle. Soon after this period Mr. Scott established himself, during the vacations, in a delightful retreat at Laswade, on the banks of the Esk, about five miles to the south of Edinburgh.

For some years before the end of the century he had been in the habit of making periodically, what he called "raids," into Liddesdale, for the purpose of collecting the ballad poetry of that romantic and most primitive district. His collections of Liddesdale, joined to various contributions from reciters in other parts of the country, formed his first publication of any note, "The Minstrelsy of the Scottish Border." This work issued in 1802, from the printing press of his early friend Mr. James Ballantyne, of Kelso. It displayed a vast quantity of curious and abstruse learning; and, in particular, a most intimate acquaintance with the district of Scotland which had hitherto received hardly any attention either from the historian or from the antiquarian.

Previous to this period, in December 1799, he had been favoured, through the interest of his friends, with the Crown appointment of Sheriff of Selkirkshire, to which was attached a salary of 300*l.* a year. This office, while it imposed no oppressive duties, rendered it necessary that he should reside a certain part of the year in Selkirkshire, and he therefore engaged the house of Ashiesteil, on the banks of the Tweed, which continued to be his country residence till he removed to Abbotsford. In 1804, Mr. Scott increased his reputation as a literary antiquary, by publishing the ancient minstrel tale of "Sir Tristram," which he showed, in a learned disquisition, to have been composed by Thomas of Ercildoune, commonly called Thomas the Rymer, a personage well known in Scottish tradition, and who flourished in the thirteenth century. By this publication, it was established that the earliest existing poem in the English language was written by a native of the Lowlands of Scotland. The manuscript was derived from the Auchinleck Library.

In 1805 he published "The Lay of the Last Minstrel," which produced to the author the sum of £600. Shortly afterwards he obtained the reversion of the honourable and easy office of a principal clerk in the court of sessions. The profits were never stationary, but seldom below £1,200. a year, which with the 300*l.* which he enjoyed as sheriff, made up a very respectable income, without regard to the result of his literary labours. During the year 1806, Mr. Scott collected his original compositions in the ballad style into a small volume, which he published under the title of "Ballads and Lyrical Pieces." In 1808, he published his second poem of magnitude, "Marmion," with which we are informed by himself, he took great pains, and was disposed to take still more, if the distresses of a friend had not "rendered it convenient at least, if not necessary, to hasten its publication." The publishers of the "Lay of the Last Minstrel," emboldened by the

success of that poem, willingly offered a thousand pounds for "Marmion." It brought an immense increase of reputation to the author. Its more stately chivalric pictures, its stronger alliance to national history, and the broader scale on which it painted feudal manners, produced greater admiration than had been excited by "The Lay."

In 1811, appeared "The Vision of Don Roderick," which proved the author to be as completely master of the Spensorian stanza as he was of the octosyllabic metre; and in 1813 he published "Rockeby," in which he attempted to invest English scenery, and a tale of the Civil War, with the charm which he had already thrown over the Scottish Highlands and Borders, and their romantic inhabitants. "Rockeby" met with a comparatively unfavourable reception. In 1814, he published "The Lords of the Isles." Even the name of Bruce, however, could not compensate the want of what had been the most captivating charm of his earlier productions—the development of new powers and style of poesy. However, "the sale of fifteen thousand copies," says Scott, "enabled the author to retreat from the field with the honours of war." "The Bridal of Triermain," and "Harold the Dauntless," were published anonymously; they made a very slight impression upon the public. It now became evident to our author that his day as a poet was well nigh past. He saw that he must "change his hand," if he wished his lyre any longer to awaken sympathetic chords in the bosom of the public. About the close of the last century, he had commenced a tale of chivalry in prose, founded upon the legendary story of Thomas the Rhymer, but it never went beyond the first chapter. Subsequently, he resolved upon a prose romance relating to an age much nearer our own time.

"Waverley" was published in 1814, and as the title-page was without the name of the author, the work was left to win its way in the world without any of the usual recommendations. Its progress for some time was slow; but, after the first two or three months, its popularity increased in a degree which must have satisfied the expectations of the author, had these been far more sanguine than he ever entertained. Great anxiety was expressed to learn the name of the author, but on this no authentic information could be atttained. His original motive for publishing the work anonymously, was the consciousness that it was an experiment on the public taste, which might very probably fail, and therefore there was no occasion to take on himself the personal risk of discomfiture.

About this period our author removed to Abbotsford, which is thus described in his own words:—"It did not possess the romantic

character of Ashiesteil, my former residence; but it had a stretch of meadow land along the river, and possessed, in the phrase of the landscape gardener, considerable capabilities. Above all, the land was my own, like Uncle Toby's bowling-green, to do what I would with. It had been, though the gratification was long postponed, an early wish of mine, to connect myself with my mother-earth, and prosecute those experiments by which a species of creative power is exercised over the face of nature. I can trace, even to childhood, a pleasure derived from Dodsley's account of Shenstone's Leasowes; and envied the poet much more for the pleasure of accomplishing the objects detailed in his friend's sketch of his grounds, than for the possession of pipe, crook, flock, and Phillis to the boot of all. My memory, also, tenacious of quaint expressions, still retained a phrase which it had gathered from an old almanac of Charles the Second's time (when every thing down to almanacs affected to be smart), in which the reader, in the month of June, is advised, for the sake of his health, to take a walk of a mile or two before breakfast, and, if he can possibly so manage, to let his exercise be taken upon his own land. With the satisfaction of having attained the fulfilment of an early and long-cherished hope, I commenced my improvements, as delightful in their progress as those of the child who first makes a dress for a new doll. The nakedness of the land was in time hidden by woodlands of considerable extent—the smallest possible of cottages was progressively expanded into a sort of dream of a mansion-house, whimsical in the exterior, but convenient within."

The nucleus of his property was a small farm, called by the plain name of Cartley-Hole, which he purchased from the late Dr. Douglas, minister of the neighbouring parish of Galashiels, and upon which he conferred the more elegant title of Abbotsford, adopted with reference to a ford in the Tweed, just opposite the spot, coupled with the adjacent Abbey of Melrose. The situation was generally considered unfortunate, as it lay on the northern slope towards the river, and was bounded close at hand by a public road. It was chiefly, nevertheless, to this spot, which he might hand down to his descendants, that the world is indebted for a series of the most delightful fictions that ever appeared. To "Waverley" succeeded, in 1815, "Guy Mannering;" in 1816, "The Antiquary," and the first series of "The Tales of my Landlord," containing the "Black Dwarf" and "Old Mortality;" in 1818, "Rob Roy" and the second series of "The Tales of my Landlord," containing "The Heart of Mid Lothian;" and, in 1819, the third series of "Tales of my Landlord," containing "The Bride of Lammermoor," and "A Legend of Montrose."

Our author having early been instructed in the disposition of the public to tire of the repeated appearances of even a favourite author, had, in the "Tales of my Landlord," assumed a new incognito, which, however, was easily seen through. It was impossible, without utterly abandoning the gifts he possessed, to assume a style sufficiently discrepant to impose upon the public. The same great magician was seen to be at work in both series, and the artifice had, therefore, only the effect of giving a slight fillip to the sale of the work. Having now drawn upon public curiosity to the extent of twelve volumes in each of his two incognitos, he seems to have thought it necessary to adopt a third; and accordingly he intended "Ivanhoe," which appeared in the beginning of 1820, to come forth as the first work of a new candidate for public favour,—namely, Lawrence Templeton. From this design he was diverted by a circumstance of trivial importance, the publication of a novel in London, pretending to be a fourth series of the "Tales of my Landlord." It was therefore judged necessary that "Ivanhoe" should appear as a veritable production of the author of "Waverley." To it succeeded, in the course of the same year, "The Monastery" and "The Abbot." In the beginning of the year 1821, appeared "Kenilworth," making twelve volumes, if not written, at least published, in as many months. In 1822 he produced "The Pirate" and the "Fortunes of Nigel;" in 1823, "Peveril of the Peak" and "Quentin Durward;" in 1824, "St. Ronan's Well" and "Redgauntlet;" in 1825, "Tales of the Crusaders;" in 1826, "Woodstock;" in 1827, "Chronicles of the Canongate," first series; in 1828, "Chronicles of the Canongate," second series; in 1829, Anne of Geiernstein;" and in 1831, a fourth series of "Tales of my Landlord," in four volumes, containing two tales, respectively entitled "Count Robert of Paris" and "Castle Dangerous." These novels, with those formerly enumerated, make seventy-four volumes.

The great success of the earlier novels had encouraged the publishers, Messrs. Archibald Constable and Company, to give large sums for those works; and previous to 1824, it was understood that the author had spent from fifty to a hundred thousand pounds, thus acquired, upon his house and estate at Abbotsford. During the months which his official duties permitted him to pass in the country,—that is, the whole of the more genial part of the year, from March till November, excepting the months of May and June,—he kept state, like a wealthy country gentleman, at this delightful seat, where he was visited by many distinguished persons from England, and from the continent. As he scarcely ever

spent any other hours than those between seven and eleven, A. M. in composition, he was able to devote the greater part of the morning to country exercise, and the superintendence of his planting and agricultural operations; while the evenings were, in a great measure, devoted to his guests. Almost every day he used to ride a considerable distance—sometimes not less than twenty miles—on horseback. He also walked a great deal; and, lame as he was, would sometimes tire the stoutest of his companions. Among the eminent persons to whom he had been recommended by his genius, and its productions, the late King George IV. was one, and not the least warm in his admiration. The poet of Marmion had been honoured with many interviews by his sovereign, when Prince of Wales and Prince Regent; and his Majesty was pleased, in March 1820, to create him a baronet of the United Kingdom, being the first to whom he extended that honour after his accession to the crown.

In 1825, Mr. Constable having projected a cheap series of original and selected works, engaged Sir Walter to compose a "Life of Buonaparte." This work was in progress, when, in January 1826, Messrs. Constable and Company became bankrupt, and Sir Walter found himself called on to meet the demands of creditors upon commercial establishments with which his fortunes had long been bound up, to the extent of no less a sum than £120,000. The blow was endured with a magnanimity worthy of the greatest writer of the age. Until the failure of Messrs. Constable and Company, the Waverley secret was kept inviolate, though entrusted, as he has himself acknowledged, to a considerable number of persons. The fact of the authorship continued to waver between secrecy and divulgement till the 23d of February, 1827, when Sir Walter presided at the first annual dinner of the Edinburgh Theatrical Fund Association, in the Assembly Rooms. There Lord Meadowbank, in proposing the health of the chairman, spoke to the following effect: "It is no longer possible, consistently with the respect due to my auditors, to use upon this subject terms either of mystification, or of obscure or indirect allusion. The clouds have been dispelled—the darkness visible has been cleared away—and the Great Unknown—the minstrel of our native land—the mighty magician who has rolled back the current of time, and conjured up before our living senses the men and manners of days which have long passed away, stands revealed to the hearts and eyes of his affectionate and admiring countrymen."

About the same time, the copyright of all Sir Walter's past novels was brought to the hammer, as part of the bankrupt stock of Messrs. Constable and Company. It was bought by Mr. Robert

Cadell, of the late firm of Archibald Constable and Company, at £8,400, for the purpose of republishing the whole of these works in a cheap uniform series of volumes, illustrated by notes and prefaces, and amended in many parts by the finishing touches of the author. Sir Walter or his creditors were to have half the profits, in consideration of his literary aid. This was a most fortunate design. The new edition began to appear in June, 1829; and such was its adaptation to the public convenience, that the sale soon reached an average of 23,000 copies. The author was now chiefly employed in preparing these narratives for the new impression; but he nevertheless found time occasionally to produce original works. In November 1828, he published the first part of a Juvenile history of Scotland, under the title of "Tales of a Grandfather," being addressed to his grandchild, John Hugh Lockhart; whom he typified under the appellation of Hugh Littlejohn, Esq. In 1829, appeared the second, and in 1830 the third and concluding series of this charming book, which fairly fulfilled a half-sportive expression that had escaped him many years before, in the company of his children,—that "he would yet make the History of Scotland as familiar in the nurseries of England as lullaby rhymes." In 1830, he also contributed a graver "History of Scotland," in two volumes, to the periodical work called "Lardner's Cabinet Cyclopædia." In the same year appeared his "Letters on Demonology and Witchcraft," as a volume of Mr. Murray's "Family Library."

The profits of these various publications, but especially his share of the profits of the new edition of his novels, enabled him to pay a dividend of six shillings and eightpence, and again another of three shillings in the pound, which, but for the accumulation of interest, would have reduced his debts to nearly one half. About the same time—that is, in November 1830—Sir Walter retired from his office as a principal clerk of the Court of Sessions, retaining a large share of the salary appropriated to that office. The government offered him a pension sufficient to make up the full amount of his usual salary—which, however, he respectfully, but firmly declined. His health, from his sixteenth year, had been very good, except during the years 1818 and 1819, when he suffered under an illness of such severity as to turn his hair quite grey, and send him out again to the world apparently ten years older than before. During the winter which succeeded his retirement from official duty, symptoms of gradual paralysis, a disease hereditary in his family, began to be manifested. His contracted limb became gradually weaker and more painful, and his tongue less readily obeyed the impulse of the will. During the summer

of 1831, the symptoms of his disorder became gradually more violent; and his physicians recommended a residence in Italy, as a means of delaying the approaches of his illness. By the kind offices of Captain Basil Hall, liberty was obtained for him to sail in his Majesty's ship the *Barham*, which was then fitting out for Malta. In April he proceeded to Rome, which he entered on the 21st, and there also he was received with every mark of attention and respect. If any thing could have been effectual in reillumining the lamp of life, this would have been the ground on which the miracle might have been expected to take place. But he was himself conscious, amidst the flatteries of his friends, that all hopes of this kind were at an end, and he determined upon returning with all possible speed to his native country. His journey was performed too rapidly for his strength. On his arrival in London, he was conveyed to the St. James's Hotel, Jermyn Street, and immediately attended by Sir Henry Halford and Dr. Holland; as well as by his son-in-law and daughter. All help was now useless. The disease had reached nearly its most advanced stage, producing a total insensibility to the presence of even his most beloved relations.

After residing for some weeks in London, the expiring poet desired that, if possible, he might be removed to his native land —to his own home. As the case was reckoned quite desperate, it was resolved to gratify him in his dying wish, even at the hazard of accelerating his dissolution by the voyage. He accordingly left London on the 7th of July, and arriving at Newhaven on the evening of the 9th, was conveyed, with all possible care, to a hotel in his native city. After spending two nights and a day in Edinburgh, he was removed, on the morning of the 11th, to Abbotsford. For two months he lingered in a state of almost total insensibility and mental deprivation, sometimes raving frantically, as if he supposed himself to be exercising the functions of a judge, but in general quite low and subdued. He was now arrived at that melancholy state, when the friends of the patient can form no more affectionate wish than that death may step in to claim his own. Yet day after day did the remnants of a robust constitution continue to hold out against the gloomy foe of life; until, notwithstanding every effort to the contrary, mortification commenced at several parts of the body. This was about twelve days before his demise, which at length took place on the 21st of September, 1832, at half-past one o'clock in the afternoon. Sir Walter Scott left four children—two sons and two daughters. Lady Scott died May 15, 1826. In stature Sir Walter Scott was upwards of six feet, bulky in the upper part of his body, but never inclining

in the least to what is called corpulency. The chest, arms, and shoulders, were those of a strong man; but the frame, in its general movements, must have been much enfeebled by his lameness, which was such as to give an ungainly, though not inactive, appearance to the figure. When walking alone he generally kept his eyes bent upon the ground, and had a somewhat abstracted and even repulsive aspect; but when animated by conversation, his countenance became full of pleasant expression.

## LORD BYRON.

George Gordon Noel, Lord Byron of Rochdale, was the grandson of the Honourable John Byron, well known as a naval commander under Lord Anson, and the son of John Byron who died at Valenciennes, in August 1791. His son, the subject of this memoir, was born at London in 1788, and succeeded to the title and estates of William, the fifth Lord Byron, at the early age of ten years. His lordship's mother died in 1811. Lord Byron spent some of the first years of his life in Aberdeenshire. His frame, which was delicate, was invigorated by the keen air of that mountainous district; and perhaps we may trace to the wild grandeur of Scottish scenery, that lofty poetic temperament, as well as that fond attachment to freedom, for which his lordship was afterwards so remarkable. In 1798, he was sent to Harrow School, of which, and of Dr. Drury, his tutor, he always spoke with strong regard. At the age of sixteen, he became a student at Trinity College, Cambridge. Here he soon distinguished himself, as well by the rapidity and extent of his acquirements, as by the originality and vigour of his youthful genius, even then too impetuous to be confined within the trammels of a merely academic course. While enthusiastically attached to classical pursuits, he caught all the inspiration to be derived from the poets and historians of Greece and Rome. The living world of men and manners was also his study; and he entered deeply into the history and political interests of his own and other nations, as well as the varied learning of modern times.

Thus accomplished, at nineteen he took up his residence at Newstead Abbey; and in about a year afterwards, embarked at Falmouth for Lisbon, and travelled in Spain, Portugal, and his beloved Greece. After an absence of nearly three years, he returned to England; and in a few months the two first cantos of "Childe Harold," perhaps the best, as well as the most interesting of his lordship's productions, made their appearance. To this poem, in rapid succession, followed the "Giaour," and the "Bride

of Abydos," both of them Turkish stories; and while the world were yet divided in opinion as to which of the three pieces the palm was due, he produced his beautiful poem, "The Corsair." On the 2d of January, 1815, his lordship married, at Seham, in the county of Durham, the only daughter of Sir Ralph Milbank Noel, Baronet, and towards the close of the same year, his lady presented him with a daughter. Within a few weeks, however, after that event, a separation took place, for which various causes have been assigned. His lordship, while the public anxiety as to the course he would adopt was at its height, suddenly left the kingdom, with the resolution never to return. From this period, the evil days of the unfortunate and erring bard seem especially to have taken their rise. He crossed over to France, through which country he passed rapidly to Brussels, pausing in his way to survey the eventful field of Waterloo. He then proceeded to Coblentz, and thence up the Rhine, as far as Basle. After visiting some of the most remarkable scenes of Switzerland, he proceeded to the north of Italy. He next took up his abode for some time at Venice, where he was joined by Mr. Hobhouse, who accompanied his lordship during an excursion to Rome, where he completed his "Childe Harold." Quitting Venice, he visited several other Italian cities, and afterwards resided for a considerable time in Tuscany. During his lordship's abode in this province the late Mr. Shelley, and Mr. Leigh Hunt, appear to have been his occasional companions. The latter gentleman has given some graphic representations of Lord Byron's habits and employments at this period, which are not devoid of interest; while they, at the same time, excite a deep regret, that this illustrious individual should have been so lost to the world, his country, and himself, as appears unhappily to have been the fact. Mr. Hunt met Lord Byron in Italy under rather novel circumstances.

"In a day or two," says Mr. Hunt, "I went to see the noble bard, who was in what the Italians call villeggiatura, or Monte-Nero; that is to say, enjoying a country-house for the season. I there met with a singular adventure, which seemed to make me free of Italy and stilettos, before I had well set foot in the country. The day was very hot; and when I got there, I found the hottest looking house I ever saw. Not content with having a red wash over it, the red was the most unseasonable of all reds, a salmon colour. Think of this, flaring over the country in a hot Italian sun! But the greatest of all the heats was within. Upon seeing Lord Byron, I hardly knew him, he was grown so fat; and he was longer in recognising me, I had grown so thin. He was dressed in a loose nankeen jacket and white trowsers, his

neckcloth open, and his hair in thin ringlets about his throat; altogether presenting a very different aspect from the compact, energetic, and curly-headed person, whom I had known in England. He took me into an inner-room, and introduced me to a young lady in a state of great agitation. Her face was flushed, her eyes lit up, and her hair (which she wore in that fashion) looked as if it streamed in disorder. This was the daughter of Count Gamba, wife of the Cavaliere Guiccioli, since known as Madam, or Countess Guiccioli—all the children of persons of rank in Italy bearing the title of their parents. The Count Pietro, her brother, came in presently, also in a state of agitation, and having his arm in a sling. I then learned, that a quarrel having taken place among the servants, the young count had interfered, and been stabbed. He was very angry; Madame Guiccioli was more so, and would not hear of the charitable comments of Lord Byron, who was for making light of the matter. Indeed there was a look in the business a little formidable; for, though the stab was not much, the inflictor of it threatened more, and was at that minute keeping watch under the portico with the avowed intention of assaulting the first person that issued forth. I looked out of a window, and met his eye glaring upwards, like a tiger. The fellow had a red cap on, like a sansculotte, and a most sinister aspect, dreary and meagre, a proper caitiff. Thus it appeared the house was in a state of blockade; the nobility and gentry of the interior all kept in a state of impossibility by a rascally footman."

After leaving Tuscany, his lordship sojourned at Genoa, and from thence proceeded to Greece, to take that part in the cause of freedom, which, if war be under any circumstances justifiable, was so honourable to himself, and glorious to his memory. The history of this expedition is the noblest portion of Lord Byron's biography, while it is, at the same time, strongly illustrative of his high and singular character. He appears to have been led thither not only by his ardent and honest attachment to the cause of liberty, but also by a splendid ambition, and strong love of personal distinction. He looked forward with eagerness to the first opportunity of distinguishing himself in the field; and it was with great difficulty that he was restrained by his physicians from taking a part in an expedition against the enemy, at a period when his health was in a very precarious state. This fire was, however, tempered by the reflection that, in the very responsible situation which he filled, prudence was the highest virtue which he could display; and, indeed, throughout the whole of his career in Greece, he conducted himself with eminent discretion. Lord Byron had, indeed, succeeded in stirring up among the people of

the part of Greece in which he had resided, an almost inconceivable enthusiasm. His exertions were incessant in their cause, and the gratitude of the people was proportioned to them. His influence was not lessened by being employed often to procure humane and even kind treatment towards the Turkish captives. Lord Byron resembled an ancient Greek in many points. As has been observed, "He reminds us of those better days of Grecian story, when valour bowed at the shrine of wisdom, and never appeared more engaging than when scattering incense over the tomb of genius. Even when a mere boy, his lordship was an enthusiast in the cause of Greece. Again and again he braved all the perils of Turkish jealousy to linger amidst scenes which his youthful studies had taught him to revere: he climbed Parnassus—swam the Hellespont—bathed his burning brow in the waters of Helicon—penned sublime verses on the plains of Marathon; and in a word, resigned himself so completely to classic association, that he seemed a Greek in spirit, though a Briton in name."

The immediate cause of his lordship's death was inflammatory rheumatic fever, supervening on a previous attack of illness, brought on by perturbation of mind, and from which he had partially recovered. Living, however, very low, and exposing himself to cold and wet, symptoms of inflammation ensued, and he became seriously indisposed. Refusing to be bled, the disorder made a rapid progress, and in ten days he was no more. His lordship's decease took place at Missolonghi, April 19th, 1824. Thus terminated the earthly career of a great spirit, while engaged in supporting by his person and influence one of the noblest causes which the records of history ever exhibited to the world. He threw his whole heart into the cause, and sealed his sincerity by his death, on the scene of action. The remains of this illustrious nobleman were conveyed to England, and deposited in the church of Hucknal Forcard, in Nottinghamshire, about four miles from Newstead Abbey, where an elegant Grecian tablet of white marble, is erected to his memory. It bears the following inscription:—

"In the vault beneath, where many of the ancestors of his mother are buried, lie the remains of George Gordon Noel Byron, Lord Byron of Rochdale, in the county of Lancaster, the author of 'Childe Harold's Pilgrimage.' He was born in London, on the 22d of January, 1788; he died at Missolonghi, in Western Greece, on the 19th of April, 1824, engaged in the glorious attempt to restore that country to her ancient freedom and renown. His sister, the Honourable Augusta Maria Leigh, placed this tablet to his memory."

Respecting the poetical works of this singular and accomplished

individual, it is unnecessary to enter into any extended remarks. They have been too long before the public to need recapitulation here. While the literature of his country endures, they will remain as an imperishable monument to the transcendent genius of their highly gifted author. The christian moralist will, however, temper his admiration with regret, while he beholds powers so mighty too often prostituted to the production of works of a dangerous, not to say a vicious tendency. In the "Don Juan," especially, the latest and worst effusion of his lordship's pen, this fault is glaringly conspicuous. This powerful and eccentric production displays, if we mistake not, the miserable tendency of sceptical principles, and uncontrolled passions, to wither and blast the finest emotions of the human soul. And who does not lament that such a soul as Lord Byron's should prefer to wander amidst the shadows of its own dark and dreary, though, it may be, sometimes sublime speculations, rather than to walk in the cheerful light, and under the benign influence of Christianity?

## Section IV.—Eminent Christians, Philanthropists, Divines, etc.

### HOWARD.

John Howard, well known as the great philanthropist of his age, was the son of a tradesman, and was born at Enfield about the year 1727. His father died while he was young, and by his will directed that his son should not be considered of age till he was five and twenty. His constitution was originally very weak, and his health having been impaired by the duties of his apprenticeship, he did not serve his time out, but bought his indentures, and indulged his curiosity in a tour to France and Italy. Upon his return he took lodgings at Stoke Newington, Middlesex. Here he was nursed with so much care and attention by the lady at whose house he lodged, that he resolved to marry her, out of gratitude for her kindness. This lady was many years older than himself, and never enjoyed good health. She died in November, 1755. In the year 1756, Mr. Howard embarked in a Lisbon packet, in order to make a tour to Portugal, but the vessel was taken by a French privateer, and he endured for some time all the hardships of a prisoner of war in France. On his return to England he fixed his residence at Cardington in Bedfordshire, and employed his time and property in forming and executing plans for the relief of poverty and distress. Here he married the eldest daughter of Edward Leeds, Esq. of Croxton, in Cambridgeshire.

In this connexion he spent the most tranquil years of his life, till his enjoyments were intercepted by the death of his wife, soon after the birth of her only son. While he lived in this retirement, his neat but humble mansion was ever hospitable to a few select friends, but was never the scene of riot or luxurious banqueting. Though polite to all, he neither sought nor admitted the company of the profligate, however distinguished by rank or fortune. His charity was not more commendable for its extent than for the manner in which it was exercised.

But the sphere in which he had hitherto moved was too narrow for his enlarged mind. Being named in 1773 to the office of high sheriff of Bedfordshire, this office brought the distress of prisoners more immediately under his notice. A sense of duty induced him personally to visit the county jail, where he observed abuses and scenes of calamity, of which he had before no conception; and he soon exerted himself to effect a reform. He visited the principal prisons in England, and was examined in the house of commons in March 1774 on this subject, when he had the honour of their thanks. Being desirous before he should publish his account of English prisons, to suggest remedies, as well as point out defects, he resolved to examine personally the practice of the continental kingdoms. For this purpose he travelled into France, Flanders, Holland, Germany, and Switzerland; and afterwards through the Prussian and Austrian dominions. He visited also the capitals of Denmark, Sweden, Russia, and Poland, and some cities in Portugal and Spain. In all these expensive and hazardous journeys, he denied himself the usual gratifications of travellers, and declined the honours which were offered him by persons of the first distinction, applying himself solely to the pursuit of his grand object. On his return in 1777, he published the information he had collected with so much care and expense, in a work which he dedicated to the house of commons. The house having zealously entered upon the business of regulating places of confinement, Mr. Howard at their request began a new tour in 1778. He travelled through the Prussian and Austrian dominions, and the free cities of Germany. He extended his tour also through Italy, and revisited some of the countries he had before seen. During the spring and summer of the year 1779, he made another complete tour of England and Wales, besides taking a journey through Scotland and Ireland. The observations he made in this tour were published in an appendix to his work, which contains also some remarks respecting the management of prisoners of war, and the hulks on the Thames.

With the design of acquiring some further knowledge on the

subject, he revisited Holland, and some German cities, in 1780. He visited also the capitals of Denmark, Sweden, Russia, and Poland, and in 1783 some cities in Portugal and Spain, and returned again through France, Flanders, and Holland. The substance of all his travels was afterwards thrown into one narrative, which was published in 1784. He also published a curious account of the Bastile, in 8vo. With a view to discover the best means of preventing infection, particularly with respect to the plague, he determined to visit the principal lazarettoes in France and Italy. Not gaining all the satisfaction here which he wished, he proceeded to Smyrna and Constantinople. Determined to obtain the fullest information of the mode of performing quarantine, he returned to Smyrna, where the plague then was, for the purpose of going to Venice in a vessel with a foul bill of health. In the course of his voyage, the ship in which he was a passenger, was attacked by a corsair from Tunis, which was beaten off after a smart skirmish. After leaving his quarters in the lazaretto of Venice, he proceeded, at the close of the year 1786, to Vienna, where he had a private conference with the emperor Joseph II. and, returning through Germany and Holland, arrived safe in England in the beginning of the year 1787.

On his return to his home, he was met by the melancholy intelligence, that his only son had fallen into a state of incurable insanity, a shock which required all his fortitude, aided by the consolations of Christianity, to sustain. In the year 1787 and 1788 he made several visits to the prisons of Scotland and Ireland. In the latter place he proposed a new and important object, that of inspecting the Protestant Charter Schools, in some of which he had before observed shameful abuses, which he had reported to a committee of the Irish house of commons. Upon his return, having again inspected the prisons in England, and the hulks on the Thames, he published the result of his last laborious investigations, in "An Account of the Principal Lazarettoes in Europe, with various papers relative to the Plague, together with further Observations on some Foreign Prisons and Hospitals, and additional Remarks on the present State of those in Great Britain and Ireland," with a number of curious plates. The work likewise contained observations on penitentiary houses, which had been encouraged by act of parliament. Not satisfied with what he had already done, he concludes his account of lazarettoes with announcing his intention again to quit his country for the purpose of revisiting Russia, Turkey, and some other countries, and extending his tour in the east. "I am not insensible," says he, "of the dangers that must attend such a journey. Trusting, however,

in the protection of that kind Providence which has hitherto preserved me, I calmly and cheerfully commit myself to the disposal of unerring wisdom."

In pursuance of this design he set out in the summer of 1789 on this hazardous enterprise. He had resolved to undertake this journey without an attendant; but a faithful servant obtained leave to accompany him. Arriving in Holland in the beginning of July 1789, he proceeded through the north of Germany, Prussia, Courland, and Livonia, to Petersburgh; thence to Moscow, and finally to the extremity of European Russia, on the shores of the Black Sea, where he fell a victim to one of those infectious diseases, the ravages of which he was exerting every effort to restrain. While residing at Cherson, a new settlement made by the late empress of Russia on the mouth of the Dnieper, he was entreated to visit a lady about twenty-five miles from thence, who was dangerously ill. From this lady he was supposed to have received the contagious disorder which proved fatal to him. He was buried near the village of Dauphiny, about five versts from Cherson, by the road to Nicholaef, in the spot he had himself chosen; and his friend, Admiral Brestman, read the English burial service, according to his desire. A monument was afterwards erected over him: this, instead of the sun-dial he had requested, consisted of a brick pyramid, or obelisk, surrounded by stone posts with chains.

In his person Mr. Howard was rather below the middle stature He had prominent features, a penetrating eye, and uncommon vivacity of manner. Though naturally of a tender constitution, he accustomed himself to so strict a regimen, both with respect to food and sleep, that he acquired the power of sustaining the greatest hardships without injury. In his public character he exceeded perhaps all others in that unceasing energy and perseverance with which he pursued his benevolent purposes; and his exertions have been celebrated by the sublimest strains of eloquence and poetry. As an instance of the former, we insert the following panegyric on Howard, by the celebrated Edmund Burke.

"I cannot name this gentleman without remarking that his labours and writings have done much to open the eyes and hearts of mankind. He has visited all Europe, not to survey the sumptuousness of palaces, or the stateliness of temples; not to make accurate measurements of the remains of ancient grandeur, or to form a scale of the curiosity of modern art; not to collect models, or collate manuscripts; but to dive into the depths of dungeons; to plunge into the infections of hospitals; to survey the mansions of sorrow and pain; to take the gauge and dimensions

of misery, depression, and contempt; to remember the forgotten; to attend to the neglected; to visit the forsaken; to compare and collate the distresses of all men, in all countries. His plan is original, and it is as full of genius as it is of humanity. It is a voyage of discovery; a circumnavigation of charity. Already the benefit of his labours is felt more or less in every country; I hope he will participate his final reward, by seeing all its effects fully realized in his own. He will receive, not by retail, but by gross, the reward of those who visit the prisoner; and he has so forestalled and monopolized this branch of charity, that there will be, I trust, little room to merit by such acts of benevolence hereafter."

## WILBERFORCE

William Wilberforce, Esq. the well-known and zealous advocate for the abolition of the slave-trade, was the son of Robert Wilberforce, Esq. a merchant of Hull, and grandson of William Wilberforce, Esq. who twice served the office of mayor of that town. Mr. Wilberforce was born August 24, 1759, at Hull. He was educated at the free school of Pocklington, and afterwards at St. John's College, Cambridge, where he graduated B.A. 1781, M.A. 1788. He was a contemporary, and formed an intimate friendship with William Pitt, and Dr. Isaac Milner, afterwards dean of Carlisle, with both whom, on quitting the university, he made a tour on the continent. Having become of age only a few weeks before the general election of 1780, he was almost unanimously returned as one of the representatives of his native town; and at the election of 1784, he was chosen for the county of York.

It was at the particular solicitation of Mr. Clarkson that Mr. Wilberforce was first induced to interest himself on the subject of slavery. At their first interview, he appeared to doubt the justice of some of the charges contained in Clarkson's book on the slave-trade; but, after further investigation, he satisfied himself of their correctness, and at a dinner given by Bennet Langton, he consented to belong to a society which had been established with a view of carrying the benevolent object of Clarkson into effect. Having also undertaken to bring the matter before the House of Commons, he gave notice of that intention soon after the meeting of Parliament, in 1787. In 1788, he was for some time very ill, and in consequence of petitions on the subject from all parts of the country, Mr. Pitt brought forward a motion in his name, hoping that, by the next session Mr. Wilberforce would himself be able to take the conduct of it. The business was not, however, proceeded with until nearly twelve months afterwards, when Mr. Wilberforce's

first motion respecting the trade in slaves was carried without a division; in the next, however, he was less successful, for, in 1791, his motion to bring in a bill to prevent the further importation of African Negroes into the British colonies was lost by a majority of 75.

In 1792, having redoubled his efforts, and been greatly assisted in them by Mr. Fox and Mr. Pitt, they were crowned with success, and the question for a gradual abolition of the trade was carried, only 85 having voted against it. In 1807, an act for the total abolition of the trade by British Merchants completed all that the legislature could accomplish on that branch of the question.

In 1797, Mr. Wilberforce published "An Apology for the Christian Sabbath;" and also a work entitled "A Practical View of the prevailing Religious System of Professed Christians in the higher and middle classes of this Country, contrasted with real Christianity," which had a very extensive circulation; having passed into three editions within twelve months of its publication, and twelve or fifteen since. It advocated sentiments in religion highly Calvinistic, and which have been deemed by some persons somewhat enthusiastic. It was warmly attacked by the Rev. Gilbert Wakefield, in a "Letter" addressed to the author; by the Rev. Thomas Belsham, in a "Review" by Dr. Cogan, in his "Letters to William Wilberforce, Esq. on the Doctrine of Hereditary Depravity, by a Layman;" and by others.

Mr. Wilberforce was re-elected without opposition for the county of York, at the elections of 1790, 1796, 1802, and 1806; but at the election of 1807, he was in danger, from the competition between the two great families of Fitzwilliam and Lascelles, who were each supposed to have spent upwards of £100,000 upon the contest. Mr. Wilberforce, however, was supported by a public subscription collected throughout the country, and was again successful. It is said that he owed his success to the adroit management of his friends, who contrived to get him the second votes of some thousands of the supporters of Mr. Lascelles, on the understanding (an understanding which was not observed) that the second votes which Mr. Wilberforce's committee could influence, should be given to Mr. Lascelles. Mr. Wilberforce published, at this period, two pamphlets addressed to the freeholders of Yorkshire; one on the Abolition of the Slave-Trade; and the other on the circumstances of the election.

In 1812, Mr. Wilberforce retired from the representation of Yorkshire, and was elected for Bramber, for which borough he also sat in the two subsequent parliaments, until he finally retired

from his senatorial duties, by accepting the Chiltern-Hundreds, in 1825. He had then sat in parliament for forty-five years.

Mr. Wilberforce possessed, in perfection, two essential attributes of popular declamation—a choice flow of pure and glowing English, and a fine modulation of a sweet and powerful voice. The copiousness of expression which a classical education conferred, and the ardent zeal which belonged to his religion and his temper, rendered him earnest, vehement, affecting, where a philosopher would be indifferent and frigid. That he was often unconsciously led into exaggeration, and unwittingly overstepped the bounds of truth—that he sometimes allowed his feelings to predominate over his reason, and attributed unworthy motives to those whose honour was as spotless as his own, cannot be denied; but, on the other hand, he devoted all his energies to the cause of humanity and to the promotion of those objects, which, in his view, were likely to conduce to the moral improvement of mankind. In 1823, Mr. Wilberforce published an "Appeal to the Religion, Justice, and Humanity of the Inhabitants of the British Empire, in behalf of the Negro Slaves in the West Indies;" he was the writer of "An Introductory Essay to Witherspoon's Treatises on Justification and Regeneration," in a series of Christian Authors, published at Glasgow; and he also made many communications to the "Christian Observer." Mr. Wilberforce married, at Walcot Church, near Bath, May 30, 1797, Barbara, eldest daughter of Isaac Spooner, Esq. of Elmdon House in Warwickshire, and a merchant in Birmingham, and niece, by her mother, to the first Lord Calthorpe. With this lady he received a handsome fortune. From the expenses of his Yorkshire elections, however, and other circumstances, this property was considerably diminished before his death, which took place July 29, 1833.

It had been intended, in conformity with the wish of the deceased, to conduct his funeral with the utmost privacy, and to inter his remains in Newington church-yard; but a very considerable number of the most distinguished members of the house of lords and commons, anxious to pay a last tribute of respect to the memory of a man who, through a long series of years, had been so honourably distinguished in the British senate, prevailed on his sons and immediate friends to allow the funeral to be a public one, and the place of interment to be Westminster Abbey. The funeral took place on the 3d of August, at about half-past twelve o'clock. The order of the procession having been arranged, the coffin, containing the remains of the deceased, was placed in the hearse, and the procession moved slowly from Cadogan-place towards Westminster Abbey, forming a very lengthened train, accompanied by immense crowds of people,

who flanked it, in moving columns, on either side; and at a little after one o'clock, the signal, that it was approaching the abbey, was given by Mr. Lee, the high constable of Westminster, to the peers and commoners, who had assembled in their respective houses of parliament, for the purpose of following the body in procession through the aisles of the abbey. The peers, amounting to a considerable number, all dressed in deep black, having put on scarves and hat-bands, proceeded from the Jerusalem chamber of the house of lords into the abbey, entering at Poet's corner, while the members of the house of commons, numbering between 100 and 200, in full mourning, proceeded two abreast to the west door of the abbey, by which they entered.

The coffin, at this period, having arrived at the western door, was removed from the hearse, and placed on the shoulders of six men; the pall of rich black velvet, with a deep border of white satin, having been thrown over it. The following distinguished individuals supported the pall;—the lord chancellor, speaker of the house of commons, Lord Bexley, and the marquis of Westminster, on the one side; the Right Honourable Charles Grant, Sir Robert Inglis, Mr. W. Smith, and his Royal Highness the duke of Gloucester, on the other. His Royal Highness was the last on the extreme right, it being a rule, according to the etiquette of such occasions, for royalty to be the last amongst the pall-bearers; the lord chancellor was the first on the extreme left. The king's boys in their uniforms, and the Westminster school-boys in their white surplices, two and two abreast, formed the van of the procession. The abbey choristers, robed in their robes of white and scarlet, together with the choristers of St. Paul's Cathedral, Whitehall Chapel, and the various other important places of public worship throughout the metropolis, next followed; then followed the peers, at the head of whom was his Royal Highness the duke of Sussex and his grace the duke of Wellington, both in deep black, and exhibiting a star on the left breast; next in order were the archbishop of Canterbury, the bishop of Chichester, and various other bishops; after them followed the dean and chapter of Westminster; then the Rev. Dr. Holcombe, accompanied by the Rev. Dr. Deakins; next to them the coffin and distinguished pall-bearers; and, lastly, the members of the house of commons, two and two abreast. The choristers, as the procession moved towards the north transept of the abbey, where the grave was formed, close to the tombs of Canning, Fox, and Pitt, chanted the funeral dirge composed by Croft. Having arrived at the grave the coffin was lowered into it; and the funeral service was most impressively read by the Rev. Dr. Holcombe, the choristers,

King's boys, &c., chaunting in occasionally, with the accompaniment of the organ. During this most solemn part of the service their Royal Highnesses the dukes of Sussex and Gloucester, the duke of Wellington, the archbishop of Canterbury, the bishop of Chester, and various other bishops, the lord chancellor, the speaker of the house of commons, and the other pall-bearers, the marquis of Lansdowne, Lord Roslyn, Lord Althorp, Lord Auckland, &c. formed a circle around the grave. The inscription on the coffin was,

"William Wilberforce, Esq.
Born 24th of August, 1759.
Died 29th of July, 1833."

Mr. Wilberforce was in person below the middle size, of a spare habit, and of rather a weakly constitution; nor were his great oratorical exertions unattended by subsequent suffering. His bust has been lately modelled by Mr. Joseph, the sculptor, and is a very striking and characteristic resemblance. Not only is the benevolent character of the original vividly expressed, but the peculiar look of the eyes, denoting that quick perception of the ludicrous which marked his character.

## BISHOP HEBER.

Reginald Heber, a late distinguished prelate, was the son of the Rev. Reginald Heber, formerly of Merton, in Yorkshire, and was born April 21, 1783, at Malpas, in Cheshire, a living held at that time by his father. From the grammar-school of Whitchurch, where he received the rudiments of his classical education, he was sent to Dr. Bristowe, a gentleman who took pupils near town; and in the year 1800, was admitted of Brazennose College, Oxford. He knew very little of the art of writing Latin verses; yet as this was the only mode of distinguishing himself, in his first year at college, he applied his mind to Latin hexameters, and, on his first attempt, in 1802, obtained the university prize; the subject was Carmen Seculare. He subsequently directed his attention to English poetry, which he composed at first with great difficulty. In 1803, the subject given for English verse was Palestine. Upon this theme Mr. Heber wrote, and with signal success. He then applied himself to the higher classics and to mathematics, in which he made considerable progress. In 1805, he took his degree of B. A. and immediately after tried his powers in English composition, and gained the prize for the English essay; the subject, "The Sense of Honour." From Brazennose college he was elected to a fellowship at All-Souls, and soon after went abroad. He travelled

through Germany, Russia, and the Crimea, in company with Dr. Clarke; whose "Travels" in the latter countries were enriched with notes extracted from Mr. Heber's MS. journal. In the preface to his first volume the learned and justly renowned traveller acknowledges his obligations to Mr. Heber. Besides his habitual accuracy, his zealous attention to which appears in every statement, Dr. Clarke mentions the statistical information, which stamps a peculiar value on his observations, and has enriched the volume by communications the author himself was incompetent to supply; especially concerning the state of peasants in Russia. Dr. Clarke adds a further acknowledgment, for some beautiful drawings engraved in that volume.

In 1808, Mr. Heber took his degree of A.M. at Oxford. The next year appeared from the press his poem, "Europe, Lines on the Present War." This poem professes to be a review of the general politics of Europe, with a wish to avoid, as much as possible, subjects purely English. The subject which predominates is the glorious struggle which then drew the attention and sympathy of all mankind to Spain. Having returned to England, and being presented to the family living of Hodnet, he married Amelia, daughter of Dr. Shipley, the late dean of St. Asaph, and thenceforward willingly devoted himself to the enjoyment of those domestic charities, which no one was better fitted to promote, and to the discharge of those unobtrusive duties which fill up the life of a country clergyman. Few days passed in which he did not spend some time in intercourse with his people; suffering neither the aged to be deprived of the consolations of religion through their inability to reach church by reason of their years; nor the sick man to be long on his bed, without one to kneel by his side; nor the poor to languish in want, without his discovering and giving them help; nor neighbours to be at strife, without supplying to them a most effectual peace-maker. Active, however, as was the life of Mr. Heber, it was still a studious life. At his parsonage he applied his vigorous intellect to the study of divinity, and in 1815 preached the Bampton lectures. The subject selected by him was "The Personality and Office of the Christian Comforter asserted and explained, in a course of sermons on John xvi. 7." About this time he composed many articles for a Dictionary of the Bible; after which, with the exception of some critical essays, both theological and literary, not unknown to the public, though without a name, and an admirable ordination sermon, delivered before the late bishop of Chester, and at his request committed to the press, he did not appear as an author till 1822. His life of Jeremy Taylor, and a review of his writings, then

made known to the world how well the interval had been spent in maturing his great knowledge by reflection, and chastening it by a sound judgment and more finished taste. In 1822, Mr. Heber was elected by the benchers of Lincoln's Inn, preacher to their society, an office which had been filled by Warburton, Hurd, and numerous dignitaries of the church. His election to this office, independently of the acknowledgment it paid to his talents and character, was valuable to him, as securing his more frequent access to the metropolis

It was not long before an occasion of employing him in a more extensive field of usefulness occurred; and on the death of Dr. Middleton, the bishopric of Calcutta was offered to Mr. Heber. He deliberated long and anxiously; he even refused the appointment; he recalled his refusal; bade farewell to a parish where he had toiled for fifteen years; and on the 16th of June, 1823, embarked for the land which was to be his grave. On the 10th of October following, the bishop, with Mrs. Heber and their family, landed at Calcutta. On the 4th of November at Dum Dum, the military station of the East India Company's artillery, a few miles from Calcutta, his lordship consecrated the new church, the foundation of which had been laid by his predecessor, Bishop Middleton, under the name of St. Stephen. On Ascension day, 1824, Bishop Heber held his primary visitation in the cathedral at Calcutta.

During the remainder of the year 1824, the whole of the year 1825, and part of 1826, Bishop Heber was engaged in travelling over the whole extent of his immense diocese. An account of his travels appeared in his Narrative, published in 1828. In this work, the superior cast of the author's mind, and the benevolence of his heart, are everywhere apparent. According to a popular periodical work, his Narrative forms a monument of talent, sufficient, singly and alone, to establish its author in a very high rank of English literature. "It is," says the writer, "one of the most delightful books in the language; and will, we cannot doubt, command popularity as extensive and as lasting as any book of travels that has been printed in our time. Certainly, no work of its class that has appeared since Dr. Clarke's can be compared to it for variety of interesting matter; still less for elegance of execution. The style, throughout easy, graceful, and nervous, carries with it a charm of freshness and originality, not surpassed in any personal memoirs with which we are acquainted. By the apparent industry with which Bishop Heber kept his journal, the activity of his mind seems to have been excited, rather than diminished, by an enervating and oppressive climate. Uniting with a constant

reference to the primary object of his tour, and the business of his sacred office, the enthusiasm of the traveller, he extended his journey in all directions; exploring, in succession, the labyrinths of the Gangetic Delta, the fertile plains of Bengal and Bahar, the forests of Kumaoon, the roots of the mighty Himalaya, and the scorching sands of Gujerat." From June to the end of the year 1824, the bishop was engaged in visiting the several European stations of Bengal, and the upper provinces of Hindoostan. In January 1825, he was at Acra, and went from thence to Jeypoor and Neemuch, to the stations under the Bombay government, including Poonah, Kaira, Baroda, Baroach, Surat, and Gujerat, consecrating churches at these several places. In May 1825, the bishop held his episcopal visitation at Bombay, where he preached on board the Honourable Company's ship *Farquharson*. In the course of this progress he laid the foundation of two central schools. He also visited the Deccan, Ceylon, and Madras, on his return to Bengal; performing at each station the duties of an apostolic bishop. During this period he appears to have zealously promoted the religious objects of the British and Foreign Bible Society. In their report for 1825, they gratefully acknowledged that "the name of Dr. Heber, bishop of Calcutta, as an accession to the cause, is in every respect most valuable. With the aid of his lordship's counsel and influence, the objects of the society must be essentially promoted; its character also will be better appreciated; and it will commend itself more and more to the community." The bishop preached at Combaconum on Good Friday, the 24th of March, 1826, and arrived the next day at Tanjore, where he preached on Easter Sunday. The following day he held a confirmation at the latter place; and in the evening addressed the assembled missionaries. Having paid a visit of ceremony to the rajah of Tanjore, and inspected the schools, he went to Trichinopoly. Here, on Sunday, April 2, he again preached and again confirmed; a rite which he repeated early the next morning in the Fort church.

From the view of a life so full of christian activity and disinterested benevolence, it is with deep regret we now advert to the subject of his premature dissolution. On his return from the Fort church he proceeded to bathe before breakfast, as he had done the two preceding days. His servant accompanied him to the bath, which was built as a separate bungalow; it was large enough for a person to swim about in it, and was filled above the height of a grown person. The servant waited outside the door. First he heard the bishop moving about in the water, as if swimming. This lasted only about four minutes; then all was

suddenly still. The servant thought his master was dressing; but when this pause had lasted nearly half an hour, he became alarmed, and knocked at the door. No answer having been returned, he at last opened it, and found the bishop at the bottom of the bath, without any signs of life. He was immediately taken out of the water, and medical assistance applied, but every effort proved ineffectual. His body was opened; and it was the opinion of the surgeons that he died of apoplexy. He was on the day following entombed in St. John's church, on the plain at the right side of the altar. The bishop, although perfectly well on the preceding days, and, as it appeared, on the very day the event took place, had yet given his chaplain to understand some time before, that he thought his life would be of no long duration, and that his demise would be sudden.

The character of Bishop Heber is too well known, and too much endeared to a most extensive circle, to need the language of panegyric. To a superior and highly cultivated mind he added all the qualities of heart that can render the man an object of love and veneration. "As a traveller, he appears to have carried to India habits and accomplishments, and to have traversed her territories under circumstances, more advantageous than any other individual, the results of whose personal observations have as yet been made public. He possessed the eye of a painter, and the pen of a poet; a mind richly stored with the literature of Europe, both ancient and modern; great natural shrewdness and sagacity; and a temper as amiable and candid as ever accompanied and adorned the energies of a fine genius. He had travelled extensively in his early life, and acquired, in the provinces of Russia and Turkey especially, a stock of practical knowledge, that could not fail to be of the highest value to him in his Indian peregrinations. His views were, on all important subjects, those of one who had seen and read much, and thought more—liberal, expansive, worthy of a philosopher and a statesman. In the maturity of manhood he retained for literature and science the ardent zeal of his honoured youth. The cold lesson, 'nil admirari,' had never been able to take hold on his generous spirit. Religion was the presiding influence; but his religion graced, as well as heightened, his admirable faculties; it employed and ennobled them all."

## ROBERT HALL.

The Rev. Robert Hall, one of the most distinguished preachers of his day, and the author of several valuable works, was son of the Rev. Robert Hall, a dissenting minister, and was born at

Arnesby, in Leicestershire, in 1764. The genius by which he was afterwards so much distinguished, was displayed in very early life; as at the age of nine years he perused and comprehended President Edwards's Treatise on the Will and the Affections. At this period he was placed with Mr. Ryland of Northampton, whence he was removed to the Bristol Institution for the education of the young men destined for the Particular Baptist ministry. This establishment was then under the direction of Dr. Caleb Evans; and his regard was soon directed to Robert Hall, whose diligence and talent were not long unknown at Bristol. At the age of seventeen, Mr. Hall removed to King's College, Aberdeen; where he soon became eminent for his application to study, and the facility with which he acquired academical distinctions. Here he became acquainted with Sir James Mackintosh, and several other gentlemen afterwards noted for their talents. At the age of twenty he commenced preaching, and having taken his degree of A. M., he became assistant to his previous instructor, Dr. Evans.

It has, however, been the fate of most men of genius to encounter more evils of one sort or other than seem generally to overtake ordinary characters. Mr. Hall, at this period, was afflicted with a temporary aberration of reason. He was therefore removed from Bristol to Leicestershire; but in the year 1791, his health was sufficiently restored to enable him to succeed the celebrated George Robinson in the ministry of a Baptist congregation at Cambridge. His predecessor had gradually declined into Unitarianism; but the energy of Mr. Hall soon effected a restoration in the affairs of the society, and finally re-established the prosperity of the church over which he presided. It was here that the first public literary effort of Mr. Hall was produced. The French revolution had, with the spirit of liberty, diffused the poison of infidelity; and the alarm which was created caused many pious but mistaken people to advocate the doctrine of passive obedience as a christian duty. Mr. Hall opposed what he conceived to be a dangerous error; and in reply to a pamphlet put forth by the Rev. J. Clayton, late minister of the Weigh-House, he demonstrated that Christianity was compatible with the highest degree of civil freedom.

The success of his first attempt to serve the cause of liberty induced him shortly after to publish his "Vindication of the Freedom of the Press," in which he evinced that whatever abuses may be contingent upon the operations of such an unrestricted engine, they are certain to be counteracted by the removal of degrading ignorance, which could never exist where knowledge was not freely circulated. The popularity of his work may be

estimated from the fact, that it very soon ran through six editions.

In 1803, Mr. Hall was again afflicted, and obliged to suspend his ministerial duties; another minister was appointed to his charge in Cambridge; and when he unexpectedly recovered, he found his office was filled. He was soon, however, invited to preside over a church in Leicester, the ministerial duties of which he discharged for upwards of twenty years, with the approbation and esteem of all who knew him. In 1825, the death of Dr. Ryland occasioned a vacancy in the presidentship of the Bristol Academy, and the pastorship of Broadmead Chapel, to which Mr. Hall was earnestly invited. After some hesitation, he removed to Bristol in 1826, having accepted the charge of the church at Broadmead, though he declined the presidency of the college. He continued to discharge his various duties as pastor of this church till his mortal career terminated. On the 10th of February, 1831, he was attacked by a severe complaint (which was subsequently discovered to have been a disease of the kidneys), and on the 26th he expired at Bristol, in the 67th year of his age.

Mr. Hall was distinguished by the possession of a powerful mind, and was gifted with eloquence of the gentle and persuasive kind: these were constantly excited in the effort to diffuse the principles of happiness among his fellow-creatures. To great talents and learning he united a most christian temper and disposition, and a liberality which embraced in its solicitudes all the civil and religious liberties of man

Mr. Hall was not less remarkable for the brilliancy of his conversational talents than for his eminence as a preacher. His manner, indeed, was somewhat abrupt, and it has been remarked by his best friends that his talent for repartee, which he could use with so much efficiency, was sometimes employed in such a manner as to be chargeable with levity, and to inflict unnecessary pain on those who were the objects of it. To those, however, who well knew the benevolence of his heart, and who could receive it in christian temper, it was occasionally the means of conveying important and valuable reproof. An instance of this is related by the author of "The Great Metropolis," in his sketch of the character of the late Rev. Matthew Wilks. "Mr. Wilks," says this writer, "was fearless and straightforward in the expression of his opinions on all subjects and on all occasions. He never hesitated to rebuke to their face his brother ministers, when he thought there was anything inconsistent in their conduct. Sometimes this caused unpleasant feelings towards him on the part of the persons so rebuked. In various instances his reproofs were resented, and

his right to administer them openly questioned. But the only person, so far as my knowledge goes, that ever fairly put Mr. Wilks down, when he was acting the part of a censor of other men's conduct, was the Rev. Robert Hall. Mr. Wilks, one day, in the presence of several ministers and other religious men, addressed Mr. Hall as follows, immediately after the latter had been indulging in those sarcasms, and jokes, at the expense of other men, to which he was so much in the habit of giving utterance :—" Mr. Hall, we all admit you are a great man ; some of us think you are a good man ; but I must plainly tell you there are many persons who doubt your Christianity altogether."

" Why so, Sir ? " inquired Mr. Hall, in his usual impatient and abrupt manner. " Why so, Sir ? Why should any man doubt my Christianity any more than your Christianity, Sir ?"

" Because, Mr. Hall," replied Mr. Wilks, " you are so much in the habit of making acrimonious remarks and sporting jokes at other people's expense."

" Well, Sir," returned Mr. Hall, " and what if I sometimes do ? The only difference, Sir, between you and me, is, that I speak my nonsense in the parlour and you speak yours in the pulpit."

Mr. Wilks, strong as were his nerves, was completely put down, as the phrase is, by the combined wit and severity of the remark. He was heard afterwards to say that " he would never again take upon himself the office of rebuking Mr. Hall for any improprieties of speech of which he might be guilty in his presence."

The entire works of this eminent writer and preacher have been published since his death under the superintendence of his intimate friend Dr. Olinthus Gregory, of Woolwich, complete in six vols. 8vo.

### DR. WILLIAM CAREY.

This eminent christian missionary and distinguished Oriental scholar was born at Paulerspury, in Northamptonshire, on the 17th of August, 1761. His father kept a small free-school in the village, in which he gave his son an ordinary English education ; but at a very early period William Carey discovered a great aptitude in acquiring knowledge, and much diligence in seeking it. When he had attained the age of fourteen years, he was apprenticed to a shoemaker in the village of Hackleton, where he attracted the notice, and obtained the friendship of the Rev. Thomas Scott, then of Ravenstone. While resident at Hackleton, and before he had reached his twentieth year, his mind became seriously and devoutly affected. He united himself in christian communion with a Baptist congregation, and commenced

village preaching, and in the year 1783, he was publicly baptized at Northampton, in the river Nen, by the late Dr. Ryland. Three years afterwards he was chosen pastor of the Baptist congregation at Moulton, near Northampton. After he had settled in this village, he married his first wife. His resources were then so limited, that he and his family often lived many days together without tasting animal food; yet he studied the Latin, Greek, and Hebrew languages, and occupied his spare time, and employed the energies of his active mind, in extracting from the Holy Scriptures, and arranging for himself, a system of divine truth.

His pursuits led to an acquaintance with the Rev. Robert Hall, then of Armsby, and with Messrs. Fuller, Sutcliff, and Ryland, other Baptist ministers in that neighbourhood, with whom he frequently communicated on the subject of religion. He was also materially assisted in his inquiries, and eventually settled in his opinions, by examining the writings of President Edwards; whose principles he is stated to have "drank in with approbation and delight." From Moulton he removed to Leicester in the year 1787, having been invited to take charge of the Baptist congregation in that town. In this new station his zeal and perseverance gained him many friends, and he made missionary enterprise among the heathen the constant subject of conversation with neighbouring ministers, until he had inspired them with views similar to his own, and disposed them to associate for the accomplishment of their benevolent purpose. This they did on the 2d of October, 1792, when they assembled at Kettering in Northamptonshire, and then formed themselves into a Baptist Missionary Society.

India was the field which they chose for the commencement of their operations, where a Mr. Thomas had been some time labouring, and returned to England to procure assistance in the cause. Mr. Carey, with Mr. Thomas, who died in India not long after his arrival, was solemnly designated to the work of an evangelist by the Baptist ministers of the midland counties, assembled at Leicester, on the 20th of May, 1793; and on the 13th of June following, the two missionaries embarked on board a Danish Indiaman, accompanied by Mr. Carey's whole family. Early in 1794, they arrived in Bengal, where, at the very commencement of their career, they encountered two discouraging events. A native, in whom they expected to meet with a convert to christianity, had relapsed into idolatry, and a small investment, which they had taken with them as the means of their support and establishment, and the boat which contained it, were sunk in the Hooghly, leaving Carey, with his wife and children, in a foreign land,

suddenly deprived of nearly all their means of subsistence. Thus desolate, they proceeded about forty miles east of Calcutta, in an open boat, in search for a home, and on the night of the 16th of February, 1794, landed at Dahetta, the residence of the late Charles Short, Esq., from whom they received the kindest attention and hospitality. With that gentleman the sister of Mrs. Carey was not long afterwards united in marriage.

While in this neighbourhood, Mr. Carey erected a temporary residence or tent, purposing to support his family by the cultivation of land; but early in the month of March he was invited to take charge of an indigo factory near Malda, the property of Mr. Udney, a servant of the East India Company of high rank. Mr. Carey accepted the invitation, and arrived there on the 15th of June following. His letters written at this period describe his feelings of extreme regret, arising out of his inability fully to execute his commission through want of a sufficient acquaintance with the native languages; and his fixed determination to devote all his energies, and all his surplus earnings, to the translation and printing, at the earliest practicable period, of the Bible in the Bengalhee language. In the year 1795, he suffered, both in his own person and in his family, much severe illness, followed by the loss of one of his children; he, nevertheless, succeeded in the establishment of a school in the neighbourhood of his factory, and began to preach there in the language of the country every sabbath day, and on one other day in every week. In 1797 Mr. Carey made a journey into Bootan, and obtained the consent of the Soudah to an attempt to introduce christianity into that country, so soon as a fit agent could be provided. In the same, and in the following years, he preached publicly at Dinagepore. Towards the close of 1799, he resolved to relinquish his appointment in the neighbourhood of Malda, and to take up his residence in the Danish settlement of Serampore, a place which has since derived its chief importance and celebrity from its being the seat of this mission. Mr. Carey appears to have been induced to take this step in consequence of the East India Company's government having, from political considerations, refused to permit some younger missionaries, who had been sent to his assistance, to establish themselves with him at his inland station.

Mr. Carey's removal from Malda to Serampore was attended by some sacrifices, but it had its countervailing advantages. At Serampore, the missionaries had assurance that their object was recognised and approved by the Danish governor, Colonel Bie, and that they would enjoy adequate protection in their missionary labours; the town of Serampore and surrounding country were

also more populous than the vicinity of Malda, and afforded better accommodation and greater facilities for printing the Sacred Scriptures in the native languages. The mission family, upon its establishment at Serampore, consisted of the senior missionary, Mr. Carey, with three younger assistants, Messrs. Ward, Marshman, and Fountain, then recently arrived from England, together with their wives and children. A school for children and youth was immediately opened, and preaching commenced; the missionaries supplying both departments of service in rotation. A printing press was also established with the consent of the governor, and under a condition that it should be confined in its operations to the printing of philological works and the Scriptures in the native languages; and an edition of the Scriptures in the Bengalhee language was immediately commenced with the aid of types from Europe.

This year, it was stated in the missionary reports, did not close without the conversion of two natives, Gokool and Kristno, who both renounced caste, and came and ate publicly with the missionaries; but their conversion caused a considerable disturbance in Serampore; the natives in that settlement, to the number of not less than 2,000, having assembled, seizing the converts, and dragging them before the Danish authorities, by whom their conduct was defended and their persons were liberated. Gokool, however, appears to have been intimidated by this violent proceeding from submitting to the ordinance of baptism as he had intended. Kristno and his family were baptized; and, shortly afterwards, several other converts followed their example.

In 1801, Mr. Carey's success in the study of the vernacular languages of India recommended him for an honourable and lucrative appointment under the government. The governor-general, Marquis Wellesley, had taken upon himself the responsibility of founding a college in Fort William, in which the junior servants might undergo a regular course of training for the public service; and he selected Carey to fill the chair of professor, in the Sanscrit, Bengalhee, and Mahratta languages. In 1805, Mr. Carey published his "Grammar of the Mahratta Language," and in the same year opened a mission chapel in the Loll bazaar in Calcutta; but in the following year, while Sir George Barlow held the provisional charge of the government of India, the Vellore mutiny occurred, supposed to have been occasioned by the apprehensions of the native troops lest the Company should determine to pursue a system of forcible proselytism. This event so alarmed the Bengal council, that orders were issued for the discontinuance, for a time at least, of all missionary exertions.

Mr. Carey was suddenly made acquainted with this order one morning on his way to his office in the college. Such, however, was the personal respect entertained towards him, that it was communicated in the form of a request that he would not preach to the natives, nor suffer native converts to preach; nor distribute, nor suffer the natives to distribute, religious tracts; nor send forth converted natives; nor take any step, by conversation or otherwise, for persuading the natives to embrace christianity. In the discussions which immediately followed this communication, Mr. Carey maintained the inexpediency, and even inconsistency with the dictates of christianity, of such an utter abandonment of its claims. The order was, therefore, very much modified; and although preaching in the Loll bazaar in Calcutta was, for a time, discontinued, the missionaries were assured that the government was "well satisfied with their character and deportment, and that no complaint had ever been lodged against them." They moreover continued to enjoy, as an ulterior resort, and so far as it might be necessary for them to avail themselves of it, the local protection of the Danish flag.

About the year 1805, Mr. Carey received from one of the British universities a diploma as doctor of divinity, and in the following year was elected a member of the Asiatic Society of Calcutta. From this period to the close of his earthly career, the mission over which Mr. Carey presided, appears to have been almost uniformly prosperous. In 1814, the missionaries had twenty stations in India, at which the distribution of religious tracts, and the Sacred Scriptures, together with the education of children, and at some of them preaching, were constantly carried on. In the following year, 1815, the new Charter Act of 1813, which had made express provision for the moral improvement of the natives of India, came into operation, and not only gave a legal sanction to the exertions of the missionaries, as schoolmasters or teachers, but provided funds, which were directed towards the same end, at least as to the education of the natives. In the department of philology Dr. Carey's labours were immense; his "Mahratta Grammar," already mentioned, was followed by a "Sanscrit Grammar," 4to, in 1806; a "Mahratta Dictionary," 8vo, in 1810; a "Punjabee Grammar," 8vo, in 1812; a "Telinga Grammar," 8vo, in 1814; also, between the years 1806 and 1810, he published the "Raymayana," in the original text, carefully collated with the most authentic MSS., in three volumes, 8vo. His philological works of a later date are a "Bengalhee Dictionary," in three vols. 4to, 1818, of which a second edition was published in 1825, and another in 8vo, in 1827—1830; a

"Bhotanta Dictionary," 8vo, 1826; also, a "Grammar" of the same language, edited by him and Dr. Marshman. He had also prepared a "Dictionary of the Sanscrit," which was nearly completed, when a fire broke out in Serampore and burnt down the printing-office, destroying the impression, together with the copy and other property. The versions of the "Sacred Scriptures," which have issued from the Serampore press, and in the preparation of which Dr. Carey took an active and laborious part, are numerous. They are in the following languages:—Sanscrit, Hindee, Brij Bhassa, Mahratta, Bengalhee, Orissa, or Ooriya, Telinga, Kurnata, Maldivian, Gujurattee, Buloshee, Pushtoo, Punjabee or Shekh, Kashmeer, Assam, Burman, Pali or Magudha, Tamul, Cingalese, Armenian, Malay, Hindosthance, and Persian; to which must be added the Chinese.

Dr. Carey lived to see the Sacred Text, chiefly by his instrumentality, translated into the vernacular dialects of more than forty different tribes, and thus made accessible to nearly 200,000,000 of human beings, exclusive of the Chinese empire, in which the labours of the Serampore missionaries have been in some measure superseded by those of Dr. Morrison. To the study of Botany he gave much attention; his principal service to this science, and his last work, was the editing his deceased friend Dr. Roxburgh's "Flora Medica," in 3 vols. 8vo. The year 1834 terminated the labours of this excellent man. His health had been declining for several years, when, in September 1833, he had a stroke of apoplexy; after this he was confined to his bed in a state of great helplessness, scarcely able to speak or to receive nourishment, till on Monday, June 9, 1834, he expired at Serampore in the 73d year of his age. He was thrice married, and had several children. A widow and three sons survived him. William, who occupied the missionary station at Cutwa; Jabez, who was employed under the government in establishing schools in the distant province of Ajmere; and Jonathan, formerly an attorney of the Supreme Court of Calcutta.

Dr. Carey's private character is thus summed up by his biographer, the Rev. Eustace Carey. "In his religious feelings and experience, his simplicity was most to be admired, and was worthy of unqualified imitation. The plain, substantial, unvarnished doctrines of the gospel, were the basis of his hope, the stay and consolation of his spirit. 'I see no one thing in all my past life,' he observes to his friend Dr. Ryland, after recovering from a serious illness, 'upon which I can rest, and am persuaded of the daily and hourly necessity of trusting my perishing soul in the hands of my Redeemer.

"'Should you outlive me, and have any influence to prevent it, I most earnestly request that no epistles of praise may ever accompany my name; such as, 'the faithful servant of God,' &c. All such expressions would convey a falsehood. May I but be accepted at last, I am sure all the glory must be given to divine grace from first to last. To me belongeth shame and confusion of face.' It was in this spirit he at length finished his course, looking for the mercy of our Lord Jesus Christ unto eternal life."

# CHAPTER VII.

## HISTORY.

Of the various kinds of reading, to which our attention may be directed for the purpose of acquiring knowledge, that of history is evidently most calculated to convey general information. "History," says a celebrated modern writer, "is the exhibition of man, the display of human life, and the foundation of general knowledge. It expands the ideas, enlarges the mind, and eradicates those narrow and illiberal prejudices which dim and corrupt the understanding. By developing the causes which influence and direct the opinions and conduct of men, in different ages, in different countries, and in different situations of life, and under different political and religious establishments, it tends to inspire liberality of sentiment, and a spirit of toleration and universal benevolence. While we contemplate the various phenomena of the moral world, and the infinitely diversified and complicated scenes of human action, history exhibits, in successive order, as in a moving picture, all the generations of men. It displays the effects of political and religious systems on nations and on individuals, and shows the rise and fall of empires, kingdoms, and states, with the causes of their prosperity and decline. In perusing the history of nations, we have an opportunity of investigating the circumstances which gave rise to their existence, procured their aggrandizement, precipitated them from their elevation, or effected their final subversion."

In a religious point of view, the advantages of history are still more evident. The religious reader of general history will observe the controlling hand of Providence in the direction of events; in turning the most unworthy actions and instruments to the accomplishment of its own purposes.

The youth who is not thoroughly armed with christian principles may be tempted to mutiny, not only against justice, but the very existence of a superintending providence, in contemplating those subsequent instances which occur in history, of the ill success of the more virtuous cause, and the prosperity of the wicked.

He will see with astonishment that it is Rome which triumphs, while Carthage, which had clearly the better cause, falls. Now and then, indeed, a Cicero prevails, and a Catiline is subdued; but often it is Cæsar successful against the somewhat juster pretensions of Pompey, and against the still clearer cause of Cato. It is Octavius who triumphs, and it is over Brutus that he triumphs. It is Tiberius who is enthroned, while Germanicus falls.

Thus his faith in a righteous Providence at a first view is staggered, and he is ready to say, "Surely it is not God that governs the earth." But on a fuller consideration, (and here the suggestions of a christian instructor are peculiarly wanted,) there will appear great wisdom in this very confusion of vice and virtue; for it is calculated to send our thoughts forward to a world of retribution, the principle of retribution being so imperfectly established in this. It is, indeed, so far common for virtue to have the advantage here, in point of happiness at least, though not of glory, that the course of Providence is still calculated to prove that God is on the side of virtue; but still, virtue is so often unsuccessful, that clearly the God of virtue, in order that his works may be perfect, must have in reserve a world of retribution. This confused state of things, therefore, is just that state which is most of all calculated to confirm the deeply considerate mind in the belief of a future state; for if all here were even, or very nearly so, should we not say, "Justice is already satisfied, and there *needs* no other world?" On the other hand, if vice always triumphed, should we not then be ready to argue in favour of vice rather than virtue, and to *wish* for no other world?

Distrust and diffidence in our own judgment seems to be also an important instruction to be learnt from history. How contrary to all expectation do events there recorded commonly turn out! How continually is the most sagacious conjecture of human penetration baffled! and yet we proceed to foretel this consequence, and to predict that event from the appearances of things under our own observation, with the same arrogant certainty as if we had never been warned by the monitory annals of successive ages.

But all knowledge will be comparatively of little value, if we neglect self-knowledge; and of self-knowledge, history and biography may be made successful vehicles. It will be to little purpose that our pupils become accurate critics on the characters of others, while they remain ignorant of themselves: for while to those who exercise a habit of self-application a book of profane history may be made an instrument of improvement in this difficult science; so without such a habit the Bible itself may, in this view, be read with little profit.

It will be to no purpose that the reader weeps over the fortitude of the christian hero, or the constancy of the martyr, if he do not bear in mind that he may be called to endure his own common trials with something of the same temper: if he do not bear in mind that, to control irregular humours, and to submit to the daily vexations of life, will require, though in a lower degree, the exertion of the same principle, and supplication for the aid of the same spirit, which sustained the christian hero in the trying conflicts of life, or the martyr in his agony at the stake.

History is commonly divided into sacred and profane. Sacred history is the history of religion before the birth of Jesus Christ, and is to be found in the Bible. Profane history includes the histories of all nations which are not written by inspired writers.

## SACRED HISTORY.

A knowledge of the early events in history, is derived entirely from the Holy Scriptures. These events, therefore, form an important part of sacred history. According to the best chronologers, the world was created about 4004 years before the birth of Christ. The names of the first man and woman were Adam and Eve; who, disobeying the positive command of their maker, entailed death and misery on their posterity. The general deluge took place 1656 years after the creation, and 2348 before Christ: in which all mankind were destroyed, except Noah and his family, who were saved in an ark built by God's command, and with them two of every kind of living creatures. Noah had three sons, Shem, Ham, and Japhet, among whom all the earth was divided. From Shem, the Hebrews were descended; Ham is said to have been the progenitor of the African tribes; and the posterity of Japhet peopled the greater part of the West.

The descendants of Noah began to disperse on the confusion of tongues, which took place at the building of the tower of Babel, as a punishment for the arrogance of men, who thought of equalling themselves with the supreme.

The next important event which happened was the calling of Abraham, who was ordered to leave his kindred and country, and go into the land of Canaan, in order that the worship of the one true God might be preserved among men, who had already become grossly corrupted.

Though the Jews frequently fell into idolatry, a portion among them always preserved the sublime truths that had been delivered to their forefathers; and a magnificent temple was erected at Jerusalem by Solomon, one of their kings in which the

holy ceremonies were performed, by a distinct order of priests, the posterity of Aaron, who were set apart for the service of God.

The Jews were indeed a favoured people, for though they often provoked God, he did not leave them without a witness of himself, sending them a succession of prophets, who foretold remote events, and announced, in terms at first mysterious, but gradually more clear, the future birth of a Messiah, who was to give them a new and more perfect law, and to abolish the rites and ceremonies established by Moses.

The public life of Jesus Christ commenced about his thirtieth year; at this age he entered on his ministry, which lasted only to his thirty-third year.

He first chose twelve disciples from among the most humble and ignorant of the people, who accompanied him in his labours of love, and imbibed the doctrines which he taught: the purity of his life corresponded with the purity of his doctrine; and at last he sealed his testimony with his blood.

On the third day he rose again, and after a stay of forty days on earth, during which he several times conversed with his apostles, instructing them how to act, he ascended into heaven, and now sitteth at the right hand of God, "making intercession for us."

The apostles, after his ascension, having received the Holy Ghost, dispersed abroad to spread the gospel of Christ; and by miracles confirmed the truth of their mission. The religion of Jesus thus rapidly spread over the world, and ten persecutions only served to establish it deeper in the hearts of mankind.

## PROFANE HISTORY.

Egypt.—The first people that formed a regular government were the Egyptians, whose history goes back almost to the deluge. The first king of this country was Menes, probably the Misraim of Scripture, who is said to have been the inventor of arts, and the civilizer of a large portion of the eastern world. His first wife was Isis, worshipped as a divinity. On his death Egypt was divided into four dynasties, Thebes, Thin, Memphis, and Tanais.

Egypt had obtained some degree of civilization under a number of petty sovereigns, called shepherd kings, but it afterwards relapsed into barbarism, which continued until the reign of Sesostris, who united the separate principalities into one kingdom; and by policy and conquest rendered himself respected at home and abroad.

The princes of the house of Pharaoh were a long time kings of Egypt, and possessed the throne, till Cambyses, king of Persia,

conquered that country, about 525 years before Christ; and under them the Egyptians were the most polished people in the world, and made the greatest proficiency in learning and science.

The respect of these people for their ancestors induced them to embalm their dead; hence the mummies still to be met with: and in order that their kings might govern wisely and justly, they sat in judgment on their lives after their death. They were great astronomers, mathematicians, and mechanics; and immense pyramids, probably the sepulchral monuments of their kings, are still among the wonders of the world.

Egypt continued under the power of Persia till the Persian empire was conquered by Alexander the Great; after whose death it again became independent under the Ptolemys; but was reduced to the state of a Roman province, on the death of Cleopatra, the wife and sister of Ptolemy Dionysius, the last king, about thirty years before the christian era.

The Ethiopians, whose country lies beyond Egypt, are supposed to have been originally a colony of the Egyptians; but their numbers, their strength, and their ferocity, soon made and kept them independent, and insulated from the rest of the world.

Assyria.—At the head of the Assyrian kings who reigned at Babylon is placed Belus, its reputed founder, and who is supposed to have been the Nimrod of the Bible.

He was succeeded by Ninus, who built Nineveh, and removed thither the seat of empire. He was the first who made war solely for the purpose of dominion. Having reduced Asia, he conquered the Bactrians, with their king Zoroaster. After this he espoused Semiramis, by whom he had a son, called Ninyas. Semiramis was a queen of heroic mind: disguising her sex, she took possession of the kingdom, instead of her son; enlarged Babylon, and surrounded it with a wall, which was 480 furlongs in extent.

Ninyas having slain his mother, took possession of the kingdom, which had been greatly improved by his parents. He was a very slothful sovereign, but rarely seen, and grew old in the company of his concubines.

Sardanapalus, the last of the Assyrian monarchs, was effeminate in the extreme. When Arbaces, governor of Media, beheld him sitting in the midst of his women, twirling the distaff and spinning the purple, he was moved with indignation. He waged war against him, and reduced him to such distresses, that he burnt himself and his riches in a fit of despair, and both perished together in the flames.

After the death of Sardanapalus, the Assyrian empire was divided

into three kingdoms; the Median, Assyrian, and Babylonian. The first king of the Median dynasty was Arbaces. This kingdom continued till the time of Astyages, who was subdued by Cyrus. Ecbatana was the metropolis of the Median, as Nineveh was of the Assyrian empire; the first king was Phul, succeeded by Tiglath-pileser, Salmanassar, Senacherib, and at last by Esarhaddon, who took possession of the kingdom of Babylon; but after his death the Assyrian kingdom was subjected to the Medes and Babylonians, who destroyed Nineveh. The principal city of the Babylonian kingdom was Babylon. Here also the royal residence was fixed. The most celebrated of the kings of Babylon was Nebuchadnezzar, who subdued almost the whole of the east. The last was Darius the Mede; but he being conquered by Cyrus, king of Persia, the Babylonians submitted to the Persians. Thus, in the time of Cyrus, there arose a new monarchy, called the Persian.

Persia.—This monarchy continued for more than 200 years, from Cyrus, whose reign began A. M. 3468, to Darius Codomannus; who being conquered by Alexander, the empire was transferred to the Greeks, A. M. 3674.

Cyrus, founder of the empire, a prince possessing many virtues, procured the return of the Jews into their own country. Cambyses, the son of Cyrus, subdued Egypt. He succeeded to his father's kingdom, but not to his virtues; for he filled every place with blood and slaughter. He was succeeded by Darius, the son of Hystaspes, who destroyed the famous city of Babylon, and not long after undertook an expedition into Scythia, in which he was unsuccessful. In the battle of Marathon his whole army was cut off by the Athenians, under the command of Miltiades.

Xerxes, a son of Darius by Atossa, daughter of Cyrus, succeeded his father. To revenge the slaughter made by the Athenians, he marched into Greece with a prodigious army, but, being vanquished by the Greeks, his army was entirely destroyed by the Spartan general Pausanias, at the battle of Platæa. Xerxes returning from this unhappy expedition, was despised by his own people, and at last slain by Artabanus, one of his own guards. He was succeeded by his son Xerxes Longimanus, who is famed for protecting the Jews, and restoring them to their own country. During several succeeding reigns we find only turbulence and murder, till at last Darius Codomannus was placed on the throne by the intrigues of Bagoas the eunuch. This emperor, being defeated by Alexander the Great in three battles, was deprived both of his kingdom and his life. He was the last of the kings of Persia, the dominion of which, ater his death, was transferred to the Greeks.

GREECE.—The ancient inhabitants of Greece were extremely barbarous. The first dawn of civilization arose under the *Titans*, a Phenician or Egyptian colony, who settled in the country about the time of Moses.

The earliest annals of Greece, which can at all be depended on, commence with Inachus, the last of the Titans, who founded the kingdom of Argos, and one of his sons, Egialtes, that of Sicyon, A. C. 1856. In the following century happened the deluge of Ogyges, A. C. 1796, after which followed a period of barbarism for more than 200 years.

Cecrops, the leader of another colony from Egypt, landed in Attica, in 1582, A. C. and connecting himself with the last king, succeeded on his death to the sovereignty. He built twelve cities, and was eminent as a lawgiver and politician.

The regal government subsisted at Athens nearly 500 years. Its last king was Codrus, who sacrificed his life for the welfare of his country; on which the Athenians chose nine magistrates, called archons, out of the principal persons in the city. Their office, which at first was hereditary, afterwards underwent several changes, and at last became annual. But these changes were not brought about quietly. The state was convulsed by them; when Draco, (who was elevated to the archonship 624 years before the christian era) endeavoured by the extreme severity of his laws, which were said "to be written in blood," to repress these disorders. About thirty years afterwards Solon, one of the wisest and best of men, established a milder and more equitable system of jurisprudence.

The republican form of government was subverted at Athens by Pisistratus, who usurped the supreme authority, which he and his posterity retained fifty years.

The next great revolution was the unfortunate issue of the Peloponnesian war; Athens then sunk under the power of the Spartans, who about 400 years B.C. imposed thirty tyrants on the Athenians. They were ultimately subdued by Philip, king of Macedon; but, by the assistance of the Romans, the Athenians afterwards, for a short time, recovered their liberties, though destined in the end to be swallowed up by that victorious nation.

The kingdom of Sparta was founded by Lælex, who made its government monarchical. The other Grecian states were founded by Perseus, who built the city of Mycenæ, and Pelops, who erected that of Elis.

The most celebrated Spartan legislator was Lycurgus, who abridged the regal power by the institution of a senate. About 130 years after his demise, five Ephori were annually elected by the people, with extensive powers, to curb the senate. Sparta, with

the other Grecian states, fell under the power of the Macedonians, and eventually became a province of the Roman empire.

The kingdom of Macedonia was founded by Caranus, an Argive; but it was of inferior rank, till Philip, conquering Greece in the battle of Cheronea, subjected all its states to his dominion; and Alexander the Great, the son of Philip, subduing Persia and India, carried the Macedonian power to the highest pitch of elevation; but dying of a debauch at Babylon, in the 33d year of his age and the thirteenth of his reign, his dominions and conquests were divided among four of his greatest generals, namely, Ptolemy, Lysimachus, Cassander, and Seleucas. Macedon continued an independent kingdom, till it was reduced to a Roman province, B.C. 168.

ROME was founded by Romulus, B.C. 753. It was at first peopled with vagabonds, slaves, and criminals, of the male sex only; in consequence of which they made war on the Sabines, and carried off their women.

The kingly power continued through seven reigns, but the only distinguished king, except Romulus, was Numa, who introduced laws and religion. The dishonour of Lucretia, a Roman matron, by Tarquin, the last king of Rome, irritated the people to such a degree, that they drove out the whole family. On this a republican form of government was established, under two magistrates, annually elected, called consuls, whose office consisted in superintending the rites of religion, in controlling the finances, levying and commanding armies, and presiding at public assemblies.

In periods of imminent danger, however, they chose a dictator, whom they invested with a temporary despotism; but the people being dissatisfied with their share in the government, were allowed to choose five magistrates, called tribunes, whose number was afterwards increased to ten, and whose office consisted in defending the oppressed, and bringing the enemies of the people to justice.

The decemviri were ten persons elected for the institution of new laws, and invested with absolute power for one year. Appius Claudius, one of the number, attempted to render the office perpetual; but the people punished the usurper, and restored the consular and tribunitian power, which had been set aside under the decemviri.

A.U.C. 394, the Gauls, under their leader Brennus, invaded Italy, took Rome, plundered it, and afterwards laid it in ashes. From this state the Romans had scarcely risen, when they began to subdue many of the neighbouring nations; and in less than 500 years from the foundation of their city by Romulus, the Romans were masters of Italy.

The Carthaginians were a powerful and commercial people on

the coast of Africa, where Tunis now stands. Becoming the rivals of Rome, they were regarded as enemies, and having assisted the enemies of the imperial city, war was declared against them. In the third war, about B.C. 146, Carthage was plundered and levelled with the ground, when the Roman empire extended over Greece, Africa, Syria, and all the kingdoms of Asia Minor.

Pompey and Cæsar having both obtained the highest dignities, and neither being willing to own a superior, Cæsar, who had been victorious in Gaul and Britain, being made dictator, set out in pursuit of his rival, Pompey, who was attended by the senate and consuls; and meeting him in the plains of Pharsalia, in Thessaly, the conflict began; when Cæsar, proving victorious, became master of the liberties of Rome, B.C. 43.

All opposition being ineffectual, Cæsar made himself absolute; till at last he was assassinated in the senate-house by the machinations of Brutus and Cassius. But the Romans did not recover their former liberties by the death of Cæsar; for Octavius, his nephew, having got rid of every competitor, had the titles of Emperor and Augustus conferred on him by the senate, and became sole master of the Roman empire, B.C. 31. This great and powerful prince, by his address, and the arts of insinuation, rendered despotism supportable to the Romans; and extended the empire from the Rhine and the Danube on the north, to the Euphrates on the east; and from the Atlantic ocean on the west, to the deserts of Arabia and Africa on the south. In this reign lived the most illustrious of the Roman classical writers.

Augustus was succeeded by Tiberius, a man infamous for every vice. Then Caius Caligula assumed the purple, who, in mockery of the Roman people, made his horse consul. To Caligula, who was assassinated, succeeded Claudius, who made an expedition into Britain, but was at last imprisoned by the empress Agrippina, that the diadem might descend to her son, the execrable Nero, one of the most cruel tyrants that ever disgraced or degraded human nature. He was finally his own executioner.

The successors of Nero were, first, Galba, who, on account of his cruelty and injustice, was assassinated; then Otho, who reigned only three months; and thirdly, Vitellius, whose reign was likewise very short. He was succeeded by Vespasian, called to rule in advanced age, in compliment to his distinguished merit. Vespasian left the empire to his son Titus, "the delight of mankind," of whom it was said, that it had been good for the Romans if he had never been born, or rather, that he had never died. Titus was succeeded by his brother Domitian, a monster of cruelty and vice. He was the last of the *twelve* Cæsars. The imperial power did

not end here, for Nerva received the purple from the assassins of Domitian, who adopted Trajan, a prince possessed of every quality that could adorn a throne. His kinsman Adrian was the successor of Trajan, who adopted the philosophic Antonius, and who left the crown to Marcus Aurelius, his son-in-law; but afterwards Commodus, his own son, assumed the purple, only to show how unworthy he was of elevated rank. He was followed by Pertinax, who rose by his virtues alone. On the death of Pertinax, the prætorian bands, or imperial guards, took upon them to expose the empire to sale, and it was purchased by Severus. It would be uninteresting to go through the whole catalogue of emperors, who rose and fell as the soldiers were inclined. But it may be proper to particularize Dioclesian, who divided the imperial dominions into four parts, over which presided two emperors and two Cæsars; and Constantine the Great, who was born in Britain, and who removed the seat of empire from Rome to Constantinople.

The Roman empire was finally divided by Theodosius into two, the eastern and the western; his son Arcadius reigned in the east, and his son Honorius in the west. But the barbarians pressing the western empire on all sides, and the Romans being sunk in effeminacy, an end was put to it by the Goths and Huns, in the reign of Augustulus, who was compelled to resign the imperial dignity, A.D. 476. The eastern empire continued till 1453, when Constantinople was taken by Mahomet II. the sultan of Turkey, and the Roman empire and people lost their names. Since that time the popes, till lately, have had both temporal and spiritual power in Rome, as also the Turks in Constantinople.

At the extinction of the Roman empire in the west, numerous states and kingdoms were formed in Europe, most of which have continued with some changes to the present day. The following is a brief historical sketch of the principal of these.

GERMANY.—The emperor of Germany, whose eldest son or heir was usually elected king of the Romans, as a preliminary step to his succession to the empire, affected to be the representative of the ancient Romans; and before the late subversion, Germany contained not fewer than 300 sovereign princes, independent in their own dominions, but forming one political body, which recognised the emperor as its head.

The present imperial family derive their origin from Rodolph, count of Hapsburgh, who by his bravery and address added several extensive countries to the empire, and formed a plan of aggrandizement, which his family long pursued.

The first emperor, after the dignity became elective, was Conrade, count of Franconia, who died in 919, and was succeeded by Henry, surnamed the Fowler, a prince of considerable talents; and who again was succeeded by his son Otho I., the most powerful prince of his age, and justly named the Great.

Henry IV., called the Great, ascended the throne in 1056, when only an infant, and had to maintain a perpetual struggle with the popes, at that time the terror and the scourge of princes, and to whom his son Henry V. disgracefully surrendered the right of investiture.

Henry V. was succeeded by Lothario, duke of Saxe Suplembourg; but in the reign of his successor, Conrade III., the sovereignty was disputed by the dukes of Bavaria, whose family name was Guelph, while the emperor's general was a native of Heighibelin; and this circumstance gave rise to the Guelphs and Ghibellines, the former of which espoused the interest of the pope, the latter of the emperor.

Frederic Barbarossa followed Conrade III., to whom he was nephew, and justified the choice that had been made of him. His son, Henry VI., imitated his glorious example; but Frederic II., the next emperor, lost all the acquisitions of his predecessors, and submitted to the influence of the pope. In 1338, however, the *Pragmatic Sanction* was established, which declared that the pope had no right to interfere in the election of an emperor.

In the reign of Maximilian I. the Netherlands became a part of the empire, about which time also Germany was divided into circles.

Maximilian was succeeded by Charles V., the most illustrious of all the emperors of Germany, and whose power extended over both hemispheres; but becoming disgusted with the world, he resigned the empire to his brother Ferdinand, and the kingdom of Spain to his son Philip II.

Leopold I. during his reign concluded the peace of Westphalia, and saw his capital, Vienna, which had been besieged by the rebellious Hungarians, aided by the Turks, relieved by the valour of Sobieski, king of Poland. His son and successor Joseph I., who mounted the imperial throne in 1705, in conjunction with the allies, carried on a successful war against France.

Charles VI. at his death leaving no male issue, the Austrian dominions devolved to Maria Theresa, whose husband Francis I., Grand Duke of Tuscany, was finally raised to the imperial dignity, after the death of Charles VII., elector of Bavaria, who had intermediately swayed the sceptre.

Joseph II., who succeeded Francis I., was a wise and benevolent prince, on whose death, without issue, his brother Leopold II., duke of Tuscany, was elevated to the imperial dignity in 1790;

and in less than two years left the throne to his son Francis II., whose reign was eventful beyond any thing that can be named in the annals of Germany. Embarking early in the confederacy against France, and being unsuccessful, by the treaty of Campo Formio he was obliged to cede the Netherlands to that power. The war being again renewed with no better success, was terminated by the peace of Luneville. Another coalition was formed to resist the insatiate ambition of Buonaparte, and fortune being still in favour of that usurper, the emperor was obliged to conclude the treaty of Presburg, and to make many fresh sacrifices, among which was that of renouncing the dignity of Emperor of Germany, and to assume only that of Emperor of Austria. At length, however, by the late change in the politics of Europe, in which this prince took so decided a part, he has not only recovered most of his former dominions, but the empire has been restored to more than its former splendour, and many new territories have been added to it. See *Geography*, chap. IX.

FRANCE.—The ancient name of France was Gaul; it received the former name from the Franks, a German tribe, who under Clovis established the French monarchy.

On the death of Clovis, a civil war arose between his sons and their successors, who could not agree in their divisions of the kingdom. At length Pepin, mayor of the palace, assumed the sovereignty, and transmitted it to his posterity.

His successor was Charlemagne, who, on the demise of his brother Carloman, became sole monarch of France; and during a long and glorious reign of 45 years, extended his dominion over the greatest part of Europe, and was crowned at Rome in 800. The posterity of Charlemagne filled the throne till 987; when Hugh Capet, a potent chief, obtained possession of sovereign power; and thus founded the third dynasty of kings in this country.

The most memorable events which took place in the succeeding reigns were,—the Crusades, which commenced in the reign of Philip I., at the persuasion of Peter the Hermit, and with the approbation of Pope Urban; the institution of parliaments, under the reign of Philip IV., surnamed the Fair, who left an only daughter, and in whom, in consequence of the Salic law, which excludes females, the direct line of Capet ended, and Philip de Valois, the next male heir, was raised to the throne in 1328; the claim made to the French crown by Edward III. of England; and the battle of Cressy, gained by that monarch.

Henry V. of England having gained the battle of Agincourt,

in 1420, a treaty was concluded, by which his son, the unfortunate Henry VI., was crowned King of France at Paris; but towards the close of that century the French recovered from the English all their possessions in that country, much to the happiness of both nations.

Joan of Arc, the pretended prophetess, who was afterwards inhumanly burnt for sorcery, distinguished herself in the reign of Charles VII., and was principally instrumental in delivering her country from the English.

For thirty years, however, France was harassed by civil wars, which began in the reign of Francis II., and which were occasioned by attempts to extirpate the protestants, or Huguenots, as they were called. At length, in the reign of Charles IX., religious fury broke out in all its violence, and on the eve of Saint Bartholomew, 1572, about 70,000 protestants were murdered by order of that execrable monarch.

In Henry III. ended the line of Valois, when Henry IV., of the house of Bourbon, ascended the throne; and proving one of the best and most amiable of princes, justly obtained the title of Great; but fell by the hand of a fanatic in 1610.

In the reign of Louis XIII. his minister Richelieu, in order to put an end to the disorders which prevailed, had recourse to the bold measure of establishing an absolute government; and the fetters which had been forged were riveted under Louis XIV., a man of the most restless spirit and unbounded ambition; but who, after a series of defeats by the English and their confederates, was obliged to conclude the peace of Rhyswick. This prince, who, notwithstanding his ambition, had some great and splendid qualities, was succeeded by his great-grandson, Louis XV., a weak and debauched monarch: upon his demise, in 1774, his grandson, Louis XVI. mounted the throne, and expiated the political crimes and follies of his predecessors, by falling under the stroke of the guillotine, Jan. 21, 1793; while a few months after, his queen, Maria Antoinette of Austria, shared the same fate, in consequence of one of the most tremendous revolutions that had ever agitated and afflicted the human race. Royalty being abolished, a republic was established, which waged a successful war with the principal powers of Europe, at the same time that it was torn with intestine divisions, and disgraced by atrocities that it makes the heart shudder to contemplate.

The republic, however, was not of long duration, for after various modifications, in which the name of liberty had been prostituted to the most unworthy purposes of faction, and deluges of blood had been spilt, it was found that the theories of govern-

ment which had been formed were incompatible with practice, and Buonaparte, a successful and enterprising general of the revolution, seized on the executive power under the title of First Consul, and associated two others with him, in name, but without authority.

Soon after he assumed the title of Emperor of the French, and King of Italy; established a military government, restored the profession of Christianity in France, and a variety of civil institutions which the frenzy of the revolution had abolished. For some time he carried his victorious arms from one side of Europe to the other; by force or by fraud he annexed Holland, as well as many of the smaller states, to France, and dictated terms of peace to every country except Great Britain. But the ambition which had prompted these excesses became his ruin: after repeated defeats in Spain, Portugal, Russia, Germany, and France, he was compelled to yield the sovereignty of the latter to one of its native princes, who had long found an asylum in England, and who ascended the throne under the title of Louis XVIII.

In 1824 this prince died, and was succeeded by his brother Charles X. whose despotic policy so exasperated the French nation that he was driven from the throne in the revolution of July 1830. Louis Philip, a descendant of the Orleans branch of the Bourbon family, was then raised to the throne with the title of King of the French.

Spain.—On the decline of the Roman power, Spain became a prey to the Suevi, the Vandals, and the Alani. Adolphus, king of the Goths, subdued them, and founded the kingdom of the Visigoths, in 411, which continued till 712, when Spain was conquered by the Saracens. At length, in the 15th century, an union of the different states or kingdoms took place under Ferdinand and Isabella, in whose reign, and under whose auspices, Columbus discovered America.

Ferdinand was succeeded by his grandson, Charles V., who, after filling Europe with his fame, resigned the crown to his son Philip II., a gloomy and vindictive tyrant, who united Portugal to his dominions, but who lost the Seven Provinces of the Netherlands, in 1579.

Under Philip IV. Portugal rebelled, and established its independence. Under his successor, Philip V. the first of the house of Bourbon, extensive wars involved Europe, which were concluded by the treaty of Utrecht. Charles III. entered into the famous family compact, and waged an unequal war with England. Charles IV. at first made a demonstration against the French

revolutionists; but changing sides, he became a vassal to France, and Buonaparte taking advantage of his weakness, carried both him and his son, afterwards styled Ferdinand VII. prisoners into France. He then endeavoured to place his brother Joseph on the throne of Spain. But the opposition he met with from the Spaniards, and the powerful support they for several years received from England, conspired finally to defeat his project, and to deliver this unhappy country from so galling a tyranny.

On the restoration of Ferdinand, his first acts were to revive the inquisition, and other abuses. The dissatisfaction with his conduct, together with the contrariety of political opinions existing in the nation, which gave rise to the Carlist civil war, have rendered Spain for some years a scene of civil commotion. Ferdinand VII. died in 1833, and was succeeded by his daughter Isabella, the present sovereign.

Sweden, Denmark, and Norway.—The history of Sweden, Denmark, and Norway, at an early period, is necessarily obscure; and, as is usual among uncivilized nations, we find little except revolutions and massacres. At length they were united under Margaret Waldemar, by the treaty of Calmar, 1387. But Gustavus Vasa, a descendant of the ancient kings of Sweden, recovered the liberty of his country in 1544, and the states made the crown hereditary in his family.

The most remarkable events during the reigns of his successors are the following: Gustavus Adolphus, a most illustrious prince, was killed at the battle of Lutzen in 1532; his daughter Christina resigned the crown in favour of his cousin, Charles Gustavus; Charles XII. one of the most extraordinary men that the world ever saw, closed his mortal career at the siege of Fredrickshall, in 1718; Gustavus III. though he had sworn to preserve the liberties of the Swedes, in violation of his oath rendered himself absolute, and was assassinated at a masked ball in 1792. On his death, his son Gustavus IV. ascended the throne, but was afterwards deposed, and his uncle called to reign in his stead; while one of the principal generals of the French empire, Bernadotte, was invested with the title of Crown Prince. At the death of the king in 1838, Bernadotte was unanimously declared king.

Poland, formerly an elective monarchy under John Sobieski, the greatest of its sovereigns, once made a distinguished figure among the European powers. It was partitioned, in 1795, under the reign of Stanislaus Augustus, by the courts of Russia, Prussia, and Austria; and since that time has undergone farther changes. Having in 1833 attempted to throw off the despotic power of

Russia, the Poles were unable to meet the overwhelming force brought against them by that power, and after repeated defeats have been at length almost blotted out from the scale of nations.

Prussia, formerly a marquisate, and then an electorate, was raised to a regal government, in 1701, by Frederic, son of Frederic William, surnamed the Great, who had paved the way to the attainment of this dignity, and who was succeeded by his son of the same name, a wise and politic prince.

Frederic William was succeeded by his son Frederic II. a great and warlike king, who filled Europe with the terror of his arms, while he cultivated the arts of peace occasionally with no less success. He left the throne to his nephew, Frederic William II. a weak and unprincipled prince; who, dying in 1797, was succeeded by Frederic William III.: the protracted reign of this prince since the overthrow of the French in Europe has proved an eminent blessing to his country.

Russia, formerly known by the old name of Muscovy, is comparatively a new country, and did not reach any considerable degree of civilization till about a century ago; though when properly governed, its power and resources entitle it to a high rank among the European nations.

The title of Czar of this country was first assumed by John Basilowitz in 1486, after having liberated Russia from the dominion of the Tartars.

From this period we read only of tyrannical governors and barbarous subjects, during a succession of reigns; for it was not till the time of Peter the Great that Russia began to assume its consequence. That he might improve his people, and instruct them in the knowledge and arts of other nations, this prince travelled into different countries of Europe, and worked as a common ship-carpenter both in Holland and England. He was the first that assumed the title of Emperor; he built Petersburg, which he made the capital instead of Moscow; extended his dominions by various conquests; and, in a word, was one of the most extraordinary men that ever appeared on the theatre of the world.

His successor was his widow Catharine, whom he had promoted to his throne, though a poor peasant, on account of the talents she displayed; and she proved worthy of his choice.

Catharine was succeeded by Peter II. grandson of Peter the Great, who performed nothing very remarkable; he was followed by Anne Duchess of Courland, an empress of considerable energy of character, and whose reign was successful.

The successor to Anne was John, son to her niece Catharine, who being deposed and murdered in 1740, Elizabeth, second daughter of Peter the Great, was elevated to the throne, and swayed the sceptre with glory.

Elizabeth was succeeded by her nephew, the duke of Holstein, who took the title of Peter III. but was soon deposed by his consort Catharine, and put to death.

A faction which she had taken care to form, then raised Catharine, the second of that name, to the throne, which she filled with glory, so far as conquest and national improvements warrant the expression; but her vices as a woman were degrading to her sex, and the policy by which her relation with foreign powers was regulated was often detestable. Yet it must be observed, that Russia has generally been most fortunate under female reigns.

The successor to Catharine II. was her son, Paul Petrowitz, who, from natural weakness, or depravity of heart, acting the part of a capricious tyrant, was deposed and murdered in 1801.

His son Alexander Paulowitz succeeded him, and made a conspicuous figure in the politics of Europe. In 1812 he joined the coalition against the French ruler, after the peace of Tilsit; and being pursued by Buonaparte to Moscow, saved his country by the sacrifice of that city. Alexander died in 1825, and was succeeded by Nicholas, the present emperor, under whose government the empire is expanding itself in every direction.

Turkey.—The Turks and Huns, who were descendants of the ancient Scythians, having established themselves in a tract of Asia called Georgia, or Turcomania, Othman, one of their princes, to whom the Ottoman empire owes its name and establishment, seized on Bithynia; and fixing the seat of his government at Prusa, assumed the title of Sultan in 1300.

The religion of the Turks is Mahometism, so called from Mahomet, an impostor, born at Mecca, in Arabia, and who, about the year of Christ 622, declared himself the greatest and last of the prophets that God would send: and by promising his followers the speedy conquest and possession of *this* world, and a paradise of delight in the *next*, but more particularly by the the sword, he extended his influence. His tenets are now professed, not only in Turkey, but in Arabia, Persia, India, Barbary, Egypt, and, in short, over the fairest portion of the old world.

The Janizaries, who are so often mentioned in Turkish history, were the guards of the sultan's person: they were established by Amurath, grandson of Othman.

Amurath was succeeded by his son Bajazet, surnamed Ilderim, or the Thunderbolt, who, after gaining many splendid victories, was at last defeated and taken prisoner by Timur Bec, or Tamerlane, a prince of the Tartars.

The sultan Mahomet II. justly named the Great, besieged and took Constantinople, which has since been the seat of the Turkish empire: and thus put an end to the eastern empire of the Romans.

Selim I. was a warlike prince, who extended the limits of the empire by the conquest of Egypt, and several countries of the east.

Solyman II. celebrated in history, and who received the appellation of the Magnificent, was unquestionably one of the greatest and most accomplished of all the sultans. He conquered the island of Rhodes, and added Hungary to his dominions, though not permanently. Selim II. his son and successor, distinguished himself likewise by besieging and taking Cyprus and Tunis.

Amurath II. extended his dominions in various quarters; but with him the general good fortune and power of the Turks seem to have declined, for since that time, in the reigns of Mahomet V. and Mustapha III., the Russians have prevailed, and considerable sacrifices of territory have been made.

There have also been many recent revolutions in Turkey. Selim III. who had filled the throne from 1789, was deposed by Mustapha IV. in 1807; who, by another revolution in 1808, was put to death, Selim was killed, and the late sultan Mahmoud raised to the throne. This prince, by his wise policy, improved the condition and prospects of the empire, but his recent death is likely to renew those scenes of anarchy and confusion to which this empire has always been subject on the demise of the sovereign.

## HISTORY OF ENGLAND.

The origin of the early inhabitants of Great Britain is not to be traced with any degree of certainty; the early history of this country being extremely vague and romantic. The most general, and indeed only probable opinion respecting it is, that Britain was peopled at various times from different parts of the continent of Europe; but the precise time when the first settlement commenced is totally unknown. The earliest authentic account is, that a colony of the subjects of Teutar, King of the Celtæ, embarking from their own coast in France, landed and settled without opposition on the coast of Great Britain. Their object

was that of increasing and extending their commerce, to which they were induced and encouraged by their sovereign, who, on account of his attachment to the commercial interests of the people, was styled *mer-cur*, or merchant; and hence we have the name of merchant.

The next people that established themselves in Britain were the Belgæ, a colony from the province of Bretagne, in the north of France: the Celtæ and the Belgæ were two branches of the Gauls, who were supposed to have been descended from Gomer, the son of Japheth, youngest son of Noah.

The ancient Britons were, in general, tall, well-proportioned, and robust; they stained their bodies with a sea-weed, called woad, which not only defended in winter the pores of the skin from the inclemency of the weather, but gave them also a formidable and tremendous aspect; in their manners they were considered a brave, warlike, and generous people, and particularly remarkable for their honesty and sincerity.

Their habitations were a sort of huts, or cottages, sometimes formed of boughs, in the nature of arbours, and sometimes of mud and clay, according to the season of the year, and were generally covered with turf. Their towns and villages consisted of a number of these huts, irregularly placed at small distances from each other, and commonly situate in woods for the convenience of pursuing their favourite diversion of hunting.

The Romans first invaded Britain under Julius Cæsar, 55 years before Christ. At first the Britons opposed them, and several battles ensued, but the Britons being defeated were compelled to sue for peace; yet, after a short campaign, Cæsar was obliged to withdraw into Gaul, whence he came.

In the following summer he returned with a great increase of force; an army of 20,000 foot, a considerable body of horse, and a fleet of 800 ships.

The Britons, under Cassibelaunus, opposed the second landing of Cæsar, but the contest was vain, for Cæsar advanced into the country, burnt Verulamium, the capital of Cassibelaunus. After forcing the Britons to submit to a yearly tribute, he withdrew his forces to the continent, and the Britons remained in quiet for nearly a century.

The next Roman emperor that undertook to conquer Britain was Claudius Cæsar, but he did not complete his purpose. The British king Caractacus made a noble stand against him, though he was at last taken captive, and carried a prisoner to Rome.

Boadicea, queen of the Iceni (the inhabitants of Norfolk and Suffolk), also opposed the Romans with great personal valour, but

she was at last defeated; and in one great battle, A.D.61, lost 80,000 of her men.

Britain was not completely conquered till 30 years afterwards, in the reign of Titus, by Julius Agricola, who introduced the Roman arts and most of the improvements of that nation.

At length, A. D. 448, the Roman empire being much on the decline, was not able to preserve so distant a province, but completely abandoned it, after having kept possession of it for 400 years.

When the Romans withdrew their forces, the Picts and Caledonians, the ancient inhabitants of Scotland, ravaged and desolated the country. The Britons first applied for aid to the Romans, but without success; they afterwards solicited succour and protection from the Saxons, who complied with the request by sending an army, A. D. 450, commanded by Hengist and Horsa.

The Saxons were successful against the Scots, but they had no sooner driven them out, than they turned their thoughts to the entire reduction of the Britons; and receiving large reinforcements of their countrymen, they reduced England under their power, and founded the Anglo-Saxon heptarchy. Many of the Britons, rather than submit to the conquerors, retired into Wales, then called Cambria, where they were sheltered by the inaccessible mountains of that country.

The Saxon heptarchy included that part of Great Britain called England: the several kingdoms of the heptarchy and their founders were as follow:—

| | |
|---|---|
| Kent, founded by | Hengist |
| Sussex, - - - | Ella |
| Wessex, - - | Cerdic |
| Essex, - - - | Erchenwin |
| Northumberland, | Ida |
| East Anglia, - | Uffa |
| Mercia, - - - | Crida. |

The most renowned defenders of the Britons against the Saxons were the celebrated Ambrosius, and the famous king Arthur; the latter was killed in battle, about the year 546. The Saxon kingdoms did not continue long united: in a short time the chiefs disputed about their several rights, and after a series of wars, which continued more than two hundred years, the whole of the heptarchy fell, and became a conquest to the power of Egbert, King of Wessex, who caused himself to be crowned at Winchester, by the title of King of England, A. D. 827.

The Danes often ravaged the coast of Britain during the reign

of Egbert, but were as often defeated, till his son Ethelwolf succeeded him, in 830, during whose feeble reign the Danes returned, and continued their depredations with but little interruption. In this reign the Picts, so formidable heretofore to the southern Britons, were entirely extirpated by their neighbours the Scots, after a long and terrible war between them.

Ethelwolf left his dominions and royal power to his second son, Ethelbert; after him to his third son, Ethelred.

During both these reigns the Danes continued their incursions, made themselves masters of Northumberland, and several other parts of England, but were strongly opposed by Ethelred, who received a mortal wound in a battle fought near Wittingham, A. D. 872, in the sixth year of his reign.

Alfred the Great succeeded to the crown of England in the year 872, when the Danes were in the very heart of his dominions, and all the seaports were filled with their fleets; after several engagements with various success, he was obliged to dismiss his very attendants; and having committed his wife and children to the care of his trusty subjects, disguised himself, and lived concealed in the little island of Athelnay, in Somersetshire. At length the Danes, finding they had no enemy to oppose them, seemed to grow negligent. Alfred, on this occasion, resolving to be satisfied of it, boldly entered the Danish camp in the disguise of a musician, and even staid there several days; then returning to his friends, he secretly assembled his troops, attacked the Danes, and routed them with great slaughter. Those who escaped fled to a castle, but were soon compelled to surrender to Alfred, who permitted them to depart on condition that their leader, Guthrum, should embrace Christianity, with which they complied, and Alfred gave Guthrum the government of East Anglia, in Essex.

Alfred, once more seated on the throne, proved himself, with scarcely an exception, the best king that ever reigned. He founded the university of Oxford; divided England into shires and counties; established a national militia; encouraged learning and learned men; invented a way of measuring time by candles, which were made to burn eight hours each, having in his time no clocks or watches; and made the navy very respectable. He reigned twenty-nine years and a half, and died October 28, 901.

He was succeeded by his son, called Edward the Elder, who fought several battles with the Danes and completely routed them; he afterwards marched against the Welsh, over whom he gained a decisive victory, and compelled the Welsh king, Rees ap Madoc, to sue for peace, and promise to pay an annual tribute for the

future. He reigned 24 years, died in 925, and was interred at Winchester. He was succeeded by his son Athelstan, who obtained a great victory over the Danes in Northumberland, after which he reigned in tranquillity. He died in the year 941, and was succeeded by his brother Edmund I. Soon after Edmund began his reign, the Danes prepared for a revolt, and recovered Northumberland, Cumberland, and Mercia; but these places were again retaken by Edmund. He was stabbed at a feast in Gloucestershire, by Leolf, a robber, whom he had caused to be banished: he was succeeded by his brother Edred, in 948.

The Danes, according to their usual custom upon the accession of a new king, revolted, and gained over to their side Malcolm, king of Scotland; but Edred, marching against them, obliged Malcolm to sue for peace. He reigned nine years, died in 958, and was succeeded by Edwy, the son of Edmund.

In the reign of Edwy, Dunstan, a proud abbot, who pretended to be a saint, raised a faction against him, which became so powerful, that Edwy was obliged to divide the kingdom with his brother Edgar. He died after a reign of about four years, and was buried at Winchester.

Edwy was succeeded by his brother Edgar, in 959, whose reign was one continued calm, without any wars or commotions. He reigned sixteen years, died in 975, aged 31, and was interred at Glastonbury. He was succeeded by his son Edward, who was murdered at the instigation of his mother-in-law.

Edward was succeeded by his brother Ethelred II. son of Edgar and Elfrida. In this reign the Danes again invaded England; they at first landed at Southampton, in 981, and for ten years afterwards there was nothing but plunderings, conflagrations, murders, and every misery imaginable. At first he purchased their absence by a great sum of money, but soon after, all the Danes who resided in England, excepting those in East Anglia and Mercia, were by his orders massacred in one day, November 13, 1002. Sweyn, king of Denmark, when he heard of this bloody act, declared he would never rest till he had revenged so monstrous an outrage. He therefore equipped a fleet of 200 ships, and soon arriving in England, made great havoc among the Britons, obliged them to pay him a large sum of money, and compelled Ethelred to take refuge in the court of his brother-in-law, Richard, duke of Normandy, 1013.

Shortly after, Sweyn dying, the nobility invited Ethelred to return; but he did not long enjoy the throne, for Canute, the successor of Sweyn, proved to be as powerful an enemy as his predecessor.

Ethelred reigned thirty-seven years, died in 1016, and was succeeded by his son Edmund, sometimes called Ironside, on account of his hardy valour. Numerous contentions happened in this reign between the English and the Danes under Canute, who, with Edmund, agreed to a participation of the kingdom. Edmund, during his short reign, exhibited proofs of the most undaunted courage, invincible fortitude, consummate prudence, and sublime generosity. He was murdered in 1017, at Oxford, by two of his chamberlains, and was interred at Glastonbury, thus making way for the succession of Canute the Dane to the crown of England. With Edmund the Saxon monarchy in a manner ended, having lasted 190 years from Egbert's establishment, 432 from the foundation of the heptarchy, and 568 from the arrival of Hengist.

Canute the Great succeeded Edmund Ironside, and was proclaimed king of England in 1017; he divided England into four parts; Mercia, Northumberland, East Anglia, and Wessex, and made the government of England such that every person should be treated alike. He reigned eight years, died in the year 1036, and left three sons; Sweyn, who had Norway; Harold, England; and Hardicanute, Denmark.

Harold died in 1039, without issue, in the fourth year of his reign, and was succeeded by his brother Hardicanute, who brought with him to England forty Danish ships; soon after he was crowned he laid a heavy tax upon the nation to pay his fleet, which he sent back to Denmark. This occasioned great murmuring and discontent among the people. He was brutally cruel and vindictive, and infamous for gluttony and drunkenness; he died suddenly, June 8, 1041, in the third year of his reign, as he was carousing at the wedding of a Danish lord at Lambeth.

The English rejoiced, and kept the day of his death as a holiday, for several centuries after, by the name of Hoctide, or Hog's tide. With him ended the monarchy of the Danes in England, after it had lasted about 26 years, but had harassed the kingdom 240 years.

Hardicanute was succeeded by Edward the Confessor, son of Ethelred and Emma, June 8, 1041, who had spent great part of his life in Normandy. During his reign he abolished for ever the tax called Danegelt, which amounted to £40,000 a year, and had been paid for 38 years; he built Westminster abbey; and collected the Saxon laws and customs into one body, which weret hence called by his name.

Edward was succeeded by Harold II. son of Earl Godwin, who had all the qualifications requisite for forming a great prince, but fell in his country's cause, at the battle of Hastings after a

turbulent reign of nine months and nine days; and with him totally ended the empire of the Anglo-Saxons in England, which had begun in the person of Hengist, above 600 years before.

William I. king of England and duke of Normandy, was one of the greatest generals of the eleventh century. He was born at Falaise, and was the natural son of Robert, duke of Normandy, by Arlotte, a furrier's daughter. After the death of Robert, which happened in 1035, William, who was his only son, succeeded him. Some time after he paid a visit to Edward the Confessor, who treated him with great respect, and took a tour with him through England.

Edward the Confessor, dying without issue in 1065, appointed him his heir, on which William sent to demand the crown; and soon after landed at Pevensey, in Sussex, with a powerful army, and thence proceeding to Hastings, built a strong fort. Harold, the reigning prince, marched to oppose him, and the bloody battle of Hastings ensued, the 14th of October, 1066, in which William obtained a complete victory, though he had three horses killed under him, and lost a great number of his troops: and Harold was slain, with many of the nobility, and about 60,000 soldiers.

The first act of sovereignty exercised by William I. after his coronation was the seizure of Harold's treasure, which he found amassed at Winchester. Part of this he distributed among the principal officers of his army; part was given to the churches and monasteries; and a large share was sent to the pope.

He instituted the courts of chancery and exchequer; but at the same time disarmed his English subjects, and forbade their having any light in their houses after eight o'clock at night, when a bell rung, called *curfew*, or *coverfire*, at the sound of which all persons were obliged to put out their fires and candles. He repulsed several invasions; obliged the Scots to preserve the peace they had broken; compelled the Welsh to pay him tribute; refused to pay homage to the pope; built the tower of London; and caused all public acts to be made in the Norman tongue. He likewise caused all England to be surveyed and rated, and had the men numbered in a work called Doomsday-book, which is still extant.

He resolved to chastise the French, who invaded Normandy, and after that to reduce his son Robert: but Robert no sooner found that he was engaged with his father, than he dutifully submitted to him, notwithstanding his being victorious. Some time after, William declared war against Philip I. king of France; burnt Nantes, and ravaged the country with fire and sword to the very gates of Paris; but approaching too near the flames of

Nantes, the heat of the fire, together with the warmth of the season, threw him into a fever, which being increased by a fall from his horse in his return to Rouen, he died at a village near that city, the 9th of September, 1087, in the 64th year of his age, after a reign of fifty-two years in Normandy, and twenty-one in England. He was interred at Caen in Normandy.

William was a prince of great courage, capacity, and ambition; he was politic, cruel, vindictive, and rapacious; stern and haughty in his deportment; reserved and jealous in his disposition.

William II. surnamed Rufus, or Red, from the colour of his hair, and his florid complexion, was the second surviving son of William the Conqueror, and succeeded his father the 27th of September, 1087. He was then 30 years of age; at the same time Robert, his elder brother, succeeded, by his father's will, to the duchy of Normandy; but he resolved to assert his right of primogeniture to the crown of England; and several of the Norman nobility espoused his cause. William, however, defeated a body of his troops in Kent, and soon after prevailed on him to conclude a peace.

The two brothers then made war on Henry, their youngest brother, whom they besieged in Mount St. Michael, where the king riding one morning unattended, fell in with a party of Henry's soldiers, and endeavoured to force his way through them: but was dismounted, and a soldier was going to dispatch him, when he saved his life by exclaiming, "Hold, fellow, I am the king of England." Upon this the man dropped his sword, raised the monarch from the ground, and received from him the order of knighthood.

The brothers being soon reconciled, William turned his arms against Scotland, and defeated the army of king Malcolm, who with his son had been killed just before in an ambush laid by Mowbray, governor of Northumberland. But Mowbray, finding soon after that the king neglected to reward his services, joined with other noblemen to set the crown on the head of Stephen, grandson to William the Conqueror. The king marched into Yorkshire, reduced Bamborough, took Mowbray prisoner, and put an end to the rebellion. But while he was hunting in the New Forest, he was accidentally wounded by an arrow, shot by Walter Tyrrel, his particular favourite, and immediately expired, on the 2d of August, 1100, aged 44, after a reign of thirteen years. It is said, so little respect was paid to his body, that it was conveyed in a coal-cart to Winchester, and was soon after interred, in a very private manner, in the church of St. Swithin.

William was equally void of learning, principle, and humanity;

he was haughty, passionate, brutal, profligate, and ungrateful. Having no legitimate issue, the crown devolved to his brother Henry.

Henry I. surnamed Beauclerc, on account of his great learning, was the son of William the Conqueror, and the youngest brother of William Rufus and Robert. His engaging person and address, his courage, learning, and eloquence, have been highly celebrated. Robert being in Palestine when William Rufus was killed, in 1100, Henry took advantage of his absence, and caused himself to be crowned king of England, on August 5, 1100; but Robert, at his return, was acknowledged duke of Normandy, and landed at Portsmouth to make good his right to the crown of England. However, Henry came to an agreement with him, by consenting to pay him an annual tribute of 3000 marks.

This tribute being but ill paid, they rekindled the war in a short time after; when Henry landed in Normandy, rendered himself master of that duchy, after the battle of Tinchebray, fought on the 27th of September, 1106, in which Robert was defeated and taken prisoner; after which Henry had the cruelty to cause his eyes to be put out, and confined him twenty years in Cardiffe castle, in Glamorganshire. He died the 1st of December, 1135, aged 68, leaving his crown to Maud, or Matilda, his daughter, but was succeeded by Stephen, his nephew.

Henry was of a middle stature, and robust make, with dark brown hair, and blue serene eyes. He had great courage and fortitude, but was vindictive, cruel, rigid, and implacable.

Henry I. was succeeded by Stephen of Blois, nephew to Henry, and son of Adela, the fourth daughter of William the Conqueror. Though Stephen had taken the oath of allegiance to Maud, or Matilda, the daughter of Henry I. in case he died without male issue, he found means to supplant her, and get the crown upon his own head. During his reign England was one continual scene of bloodshed and horror, from the contest between Maud, Stephen, and the barons; at length it was agreed, that Stephen should enjoy the crown during his life, and then it should descend to young Henry, son of Maud. He reigned eighteen years, and died Oct. 25, 1154, in the fiftieth year of his age.

Henry II. surnamed Plantagenet, the son of Maud and Geoffrey Plantagenet, and grandson of the count of Anjou, succeeded Stephen. In his reign lived the celebrated Fair Rosamond, daughter of Lord Clifford, who was his mistress; her beauty and fate have rendered her name famous. Thomas à Becket was also a remarkable personage at this time: he had been raised from a mean station to be archbishop of Canterbury. Henry had seven

children, namely, Henry, Geoffrey, Richard, John, and three daughters; the two younger sons succeeded. He died July 6, 1186, in the fifty-seventh year of his age, and thirty-fifth of his reign.

Henry II. was succeeded by his son Richard, surnamed Cœur de Lion, or Lion-hearted. He was a man of great ability, wit, and generosity; full of the heroic valour of the times, he went to Palestine, or the Holy Land, with the crusaders, and seemed to forget that he was king of England. Richard was the first who assumed the motto of "God and my right," and affixed it to his arms. It is said of him, that when he pardoned his brother John, after repeated treasons, he said, "I forgive you, and wish I could as easily forget your injuries as you will my pardon." He was shot at the siege of the castle of Chaluz, near Limoges, in France, and died eleven days after, on the 6th of April, 1199.

John, surnamed Sans Terre, or Lack Land, succeeded. He appears not to have been possessed of one good quality, and to have been as unfortunate as he was weak. He was engaged in continued wars with the barons, and contests with the popes. He is accused of murdering his nephew Arthur, son of Geoffrey, the eldest son of Henry II. and lawful heir to the crown. Shakspeare has written a fine tragedy on this circumstance. The barons taking up arms against him, on account of his tyrannical conduct, he signed Magna Charta, so justly esteemed as the foundation of English liberty. It was a bill, or act of parliament, granting to the barons and citizens greater privileges than they had ever enjoyed before; by this act the feudal law was abolished, and English freedom restored. He reigned seventeen years, died Oct. 18, 1216, and was buried in the cathedral at Worcester.

Henry III. who was born at Winchester, succeeded to the crown. He was as weak a monarch as ever sat on a throne; a narrow genius, without courage or conduct, perhaps occasioned by his succeeding to the throne so young, he being only eleven years old when his father died. In his reign the Court of Common Pleas was first instituted, aldermen were first appointed, and the first regular parliament was called. The reign of Henry is the longest upon record. He died November 16, 1272, having reigned fifty-six years, and was interred in the abbey church of Westminster, near the shrine of Edward the Confessor.

Edward I. proved himself to be a great and wise king. He subdued Wales, and annexed it to England; he also carried on a war in Scotland with great success; and he was not less careful of extending the commerce than the glory of the people; but he was very cruel to the Jews, for no less than 15,000 were in his

reign robbed of their effects, and banished the kingdom; since which time very few Jews have lived in this country. The eldest son of Edward I. was born at Carnarvon, in Wales, and at the age of seventeen was invested with the principality of that country. From that time the king's eldest son has been styled Prince of Wales. Edward I. reigned thirty-four years, and died at Carlisle, July 7, 1307, aged sixty-eight. In his reign, geography and the use of the globes were introduced; tallow candles and coals were first common; windmills invented, and wine was first sold, though only as a cordial, in apothecaries' shops.

Edward II., surnamed Carnarvon, a weak prince, was cruelly murdered by the order of his queen, in Berkeley castle, A.D. 1327. He was succeeded by his son Edward, Prince of Wales, who was born at Windsor.

Edward III. was a wise king, and one of the most renowned monarchs that sat on the English throne. He had nine children, five sons and four daughters; the most celebrated was Edward, the eldest, called the Black Prince, from the colour of his armour; he died before his father. The other sons were Lionel, duke of Clarence; John of Gaunt, duke of Lancaster; Edmund, duke of York; and Thomas, duke of Gloucester.

The principal events in this reign were the battles of Cressy and Poictiers; the defeat of the Scots; the surrender of Calais to the English; and a great naval victory over the French. The famous battle of Cressy was fought between the French and English, in 1346; the French army consisted of 120,000 men, out of which about 37,000 were slain, besides many prisoners, and the others put to flight. The English army consisted of 30,000 men. The most celebrated among the slain was the king of Bohemia. The crest of this monarch was three ostrich feathers, and his motto these German words, Ich dien, I serve; which the then prince of Wales, the Black Prince, adopted in memorial of this great victory, and his successors have borne them ever since.

Richard II., the son of Edward the Black Prince, was only eleven years old when he came to the throne. He was admired, while a boy, as having a good and open spirit; but when he grew up to be a man, he became weak and effeminate. He was deprived of his crown by Henry, duke of Lancaster, and starved to death in Pomfret castle.

The principal events in the reign of Richard II. were, an insurrection occasioned by a tax of one shilling, ordered to be paid by every person above fifteen, making no difference between the rich and common people; and the usurpation of Henry, duke

of Lancaster, which gave rise to the numerous and fatal contests of the White and Red Rose, or the houses of York and Lancaster. Cards were invented also in the time of Richard II. for Charles VI. king of France, called the well-beloved; he was insane the greater part of his life, and during the intervals of reason, cards were produced as an amusement for him.

Henry IV., duke of Lancaster, surnamed Bolingbroke, succeeded Richard II. He was the eldest son of John of Gaunt, duke of Lancaster, fourth son of Edward IV. He was crowned Oct. 13, 1399, and ascended the throne upon the forced resignation of Richard II.

In his reign lived Chaucer and Gower, both English poets; and William of Wickham, bishop of Winchester. It is recorded of the eldest son of Henry, when prince of Wales, that Sir William Gascoine sent him to prison for contempt of his authority. One of his dissolute companions being brought before this magistrate for some offence, Henry, who was present, was so provoked at the issue of the trial, that he struck the judge in open court. Sir William, fully sensible of the reverence due to his authority, committed him to prison; and when the king heard of it, he exclaimed, "Happy is the king who has a subject endowed with courage to execute the laws upon such an offender; and still more happy in having a son willing to submit to such chastisement. Henry had four sons and two daughters, and was succeeded by his eldest son Henry."

Henry V. was so courageous that no danger could startle, and no difficulty hinder; nor was his policy inferior to his courage. He was chaste, temperate, and modest, and without an equal in the art of war, policy, and government.

The principal event in his reign was the conquest of France, which he undertook as soon as he came to the throne. It was Henry who gained the celebrated victory of Agincourt. No battle was ever more fatal to the French, by the number of princes and nobility slain and taken prisoners. Henry was afterwards declared heir to the French monarchy. He had only one child, the prince of Wales, who was not a year old when his father died. The queen, after the death of Henry, married Sir Owen Tudor, a Welsh gentleman, said to have been descended from the princes in that country, by whom she had two sons.

The most remarkable events of the reign of Henry VI. were the loss of France, and the dreadful contests between the houses of Lancaster and York, called the factions of the Red and White Roses; that of Lancaster being termed the Red Rose, and York the White. The duke of York was killed, but his son Edward

continued the claim, and routed Henry VI. who was confined in the Tower, and most probably murdered in 1475, on whose death Edward ascended the throne.

Edward was brave, active, enterprising; but severe, revengeful, and luxurious. In this reign printing was first introduced, and polite literature encouraged among the English, notwithstanding the civil war, which raged with great fury. He reigned twenty-two years, and died April 9, 1483, aged forty-one years, leaving six children, namely, two sons and four daughters.

His eldest son, the prince of Wales, succeeded him at thirteen years of age, as Edward V. As he came to the throne so young, and was either murdered or carried out of the kingdom soon after his accession, his character cannot be known. Some say he was smothered in the Tower with his brother, the duke of York, in 1483.

Richard III., duke of Gloucester, surnamed Crook-back, who was brother to Edward IV., was proclaimed king of England, June 20th, 1483, and was killed at the famous battle of Bosworth, contending for the kingdom with Henry, then earl of Richmond, Aug. 24, 1485, after a reign of two years. He was the supposed murderer of his two nephews, and was a compound, both in mind and person, of cruelty and deformity; with his death ended the line of York.

Henry VII., earl of Richmond, was crowned in Bosworth field immediately after the battle. Henry was the son of Edmund Tudor, earl of Richmond, and of Margaret, a descendant from John of Gaunt, duke of Lancaster. He, by marrying a daughter of Edward IV., united the houses of York and Lancaster, and by that means put an end to the civil war. In this reign America was discovered by Christopher Columbus, a native of Genoa; shillings were first coined in England; and a passage to the East Indies discovered by the Portuguese. There was also a rebellion headed by one Perkin, who pretended to be the son of Edward IV., but the prudence and sagacity of Henry defeated this and every other plot against his government. He reigned twenty-three years, died at Richmond, April 22, 1509, aged fifty-one, and was succeeded by his son Henry.

Henry VIII. was learned, but obstinate, despotic, and cruel. In his reign the Reformation was begun; and the famous battle of Flodden Field was fought, in which James IV., king of Scotland, with the flower of his nobility, fell. Henry had six wives—Catherine, who was his brother's widow, from whom he was divorced; Anne Boleyn, who was falsely accused and beheaded; Jane Seymour, who died in child-bed; Anne of Cleves, whom he dis-

liked and divorced; Catherine Howard, who was beheaded; and Catherine Parr, who survived him. He left three children: Edward prince of Wales, by Lady Jane Seymour, who succeeded him; Mary, his daughter by his first queen; and Elizabeth, daughter of Anna Boleyn, afterwards queen. He died after a reign of thirty-seven years and nine months, in the fifty-sixth year of his age.

Edward VI. succeeded his father at the age of nine years and three months, A.D. 1547. He was a very amiable, learned, and pious young man, and died July 1, 1553, in the sixteenth year of his age. He left the crown to Lady Jane Grey his cousin, who reigned only ten days, and was then deposed by Mary, Edward's sister.

Mary, the daughter of Henry VIII. was crowned October 1, 1553. She was extremely bigoted to the catholic religion; also proud, imperious, and revengeful. She was married to Philip II., king of Spain. The most remarkable event in the reign of Mary was the persecution of the Protestants, great numbers of whom were burnt in Smithfield, Oxford, and other places, as heretics. Amongst the most remarkable were the bishops Latimer, Cranmer, Hooper, and Ridley. Calais, the only place that was left us in France, was also lost in her reign. Mary reigned about five years; she died November 17, 1558, aged forty-two, and was succeeded by her sister Elizabeth.

Elizabeth was the daughter of Henry VIII. by Anne Boleyn, and sister to Mary and Edward. She was a woman of great spirit, judgment, and address; understood the dead and living languages, and had made a good proficiency in the sciences, as well as read in history; but her putting Mary queen of Scots to death, is a great stain in her character. Mary, queen of Scots, was the daughter of James V. king of Scotland, and cousin to Elizabeth; she was famed for her beauty and misfortunes. She was prisoner in England eighteen years, and was at length beheaded at Fotheringay castle, in Northamptonshire.

The principal events in the reign of Elizabeth were, the destruction of the Spanish Armada, in 1588, which was intended for the conquest of England, and perhaps was the largest fleet ever fitted out by any nation; the Reformation, a most important event, which fixed the present religious establishment of the country; and the discovery of Virginia in America. Elizabeth reigned forty-four years; she died March 24, 1603, aged sixty-nine and was succeeded by James I. of England and VI. of Scotland.

The principal event in this reign was the gunpowder plot, which was a scheme of the Roman catholics to blow up both houses of parliament, by laying a train of gunpowder under them, when the

king, princes, lords, and commons should be assembled, Nov. 5, 1605. The conspirators had hired a cellar beneath the parliament house, under a pretence of a store-house for coals, in which they placed thirty-six barrels of gunpowder; those they covered over with coals and faggots, and one Guy Faux, who was to have set fire to the train, was actually taken in the cellar with a dark lantern, tinder box, and matches in his pocket. The plot was discovered, by an anonymous letter being sent, through private friendship, from one of the conspirators to Lord Mounteagle, in order to prevent his going that day to parliament, and thus to avoid the dreadful catastrophe. James was king of Scotland 36 years before he succeeded to the English crown, and 21 years king of England. He died A. D. 1625, aged 58. He was crowned king of Scotland when only a year old.

Charles I., second son of James I. of England, succeeded his father, March 27, 1625. The most striking events in this reign were the wars between Charles and his Parliament; the execution of Lord Strafford and Archbishop Laud, and afterwards that of the king himself, who was taken prisoner by the Parliament.

Oliver Cromwell was chosen protector of England in 1653, being four years and three months after the commencement of the commonwealth, which before was managed by the parliament. He was protector for five years, and died Sept. 3. 1658. He was succeeded in the protectorship by his eldest son, Richard, who, however, retained the situation only three months.

Oliver Cromwell was a man of great courage, but an enthusiast in the highest degree. The principal events of his time were, a war with the Dutch, who were defeated; Jamaica conquered and made an English province. The great poet Milton lived in the time of Cromwell, to whom he was Latin secretary.

Charles II., son of Charles I., on July 3, 1646, went from Jersey into France, and remained abroad till May 1660, when he arrived in London, and was proclaimed king of England the 29th of the same month.

The principal events of his reign were, the great fire in London in 1666, and the Plague the year before; in this reign the Royal Society was established. Several men of genius flourished; Boyle, Dryden, Otway, Butler, Temple, Waller, Cowley, Halley, and the earl of Arundel. Charles II. reigned 24 years, and died February 1685, in the 55th year of his age, and was succeeded by his brother James.

James II. was a bigot to the Romish religion, and fond of arbitrary power. In his reign the duke of Monmouth rebelled; he

was proclaimed king at Taunton, but being afterwards taken prisoner, was beheaded in London. The attempts of James II. to restore the Roman catholic religion obliging him to abdicate the throne, he retired to France, where he died, 1701, leaving three children, James, Mary, and Anne.

James having deserted the throne, the prince and princess of Orange were declared joint sovereigns, July 13, 1689. William III. was the son of William, prince of Orange, and of Henrietta Maria, daughter of Charles I. He was born at the Hague, in Holland, in 1650, and was married to Mary, eldest daughter of James II. William was a great warrior, and a steady friend to the protestant religion, and civil liberty. Mary, though her father was a strong papist, was also a firm protestant; she was an excellent wife, and a truly pious woman. Her person was very handsome; she died before William, in 1694. William's death was occasioned by a fall from his horse, 1702. He expired in the 52d year of his age, and the 13th of his reign.

The principal events of this reign were, the battle of the Boyne, in Ireland, where king James II. was defeated; the French fleet destroyed off La Hogue; and the Bank of England established. Newton, Locke, Tillotson, Prior, and Burnet, flourished in this reign.

William and Mary had no children; they were succeeded by Anne, second daughter of James II., who was married to Prince George, brother to the king of Denmark. Queen Anne is said to have possessed many excellent qualities. The principal events of her reign were, the battles of Blenheim, Ramillies, and several others, won by the great duke of Marlborough; the defeat of the combined fleets by Sir George Rooke; Gibraltar taken by the English; and the union of England and Scotland, under the title of Great Britain, 1707. Queen Anne reigned twelve years and a half. The most celebrated literary characters in her reign were, Pope, Swift, Congreve, Rowe, Bolingbroke, Shaftesbury, Addison, and Steele.

George I., who was previously elector of Hanover and Lunenburgh, and a descendant of James I., succeeded to Anne; he was a good king, and an enemy to every species of tyranny. The principal events of this reign were, the rebellion of the Scots, in favour of the Pretender, son of James II., which was soon quelled, and the Pretender obliged to retire to France, 1717; the electorate of Hanover annexed to the British crown; inoculation first introduced into England, and successfully tried upon two condemned criminals, who were pardoned on submitting to the operation.

George I. died in the sixty-eighth year of his age, and the thirteenth of his reign, 1727.

George I. was succeeded by his son George II., who reigned from 1727 to 1760. In this reign the river Thames was frozen, and a fair held on it, 1740; the Scots again rebelled in favour of the Pretender, but were defeated in 1747; Westminster bridge was built; Admiral Anson took a Spanish ship, with treasures to the amount of £1,500,000; Quebec was taken, and General Wolfe killed.

George II. had seven children, two sons and five daughters the eldest son, Frederick, prince of Wales, dying before his father, his grandson, George William Frederick, ascended the throne of England.

George III succeeded his grandfather October 25, 1760, being then twenty-four years of age. He was married to Charlotte Sophia, Princess of Mecklenburgh Strelitz, and they were crowned September 20, 1761. In the early part of his reign, war was declared with America, which led to that country eventually throwing off its allegiance to Great Britain, 1776. The levying of certain duties to be payable by the American colonies in aid of the public revenues being resisted, it became necessary to use measures, which brought forward an open defiance on the part of that country to the restraint of the British government.

The revolution in France commenced in the year 1786, and for a long time France exhibited a continued scene of bloodshed, rapine, and misery, under a delusive idea of civil liberty being substituted for the old regal government; in which the king, Louis XVI., was made a sacrifice by the guillotine, together with the queen and many of the nobility, and innumerable other persons of every rank, who became objects of dislike to the various factions in power. The tranquillity of England was much disturbed by the French revolutions; for after the death of the king of France, England and Holland engaged in war with that country; Austria and Prussia, alarmed with the principles disseminated by the French, had previously declared war against France in their own defence. The continental powers being defeated, and their kingdoms overrun by the French, they were obliged to make peace, and Great Britain was for a time left to contend alone with France.

After that country had been successively in the power of various succeeding factions, a form of government was at length settled, under the dominion of three consuls, whereof the first, as chief, was Napoleon Buonaparte, a Corsican by birth, and a general in the French service, who afterwards altered the government, and caused himself to be declared emperor of France.

But previously to this the French had sent an expedition to subdue Egypt under Buonaparte. Their fleet was attacked in the bay of Alexandria, by Admiral Lord Nelson, who completely defeated them, with great loss of both ships and men; which memorable action was called the victory of the Nile. The French army also was beaten by Sir Ralph Abercrombie, who lost his life in the moment of victory. These great events at length obliged the enemy to abandon their views of Egypt. The war between England and France was brought to a conclusion in the year 1802; but it was of short duration, for the restless ambition of the French ruler gave reason to suspect he was preparing for new aggressions, and disputes taking place between the two governments, war was resumed the following year. Soon after the renewal of hostilities, a great naval advantage was gained by this country at the ever memorable battle of Trafalgar, in which the undaunted hero, Admiral Lord Nelson, achieved a splendid victory, but unhappily for his country, he was himself slain. In testimony of grateful respect, his remains were honoured with a public and splendid funeral in St. Paul's church; and his death was justly deplored as a national calamity.

In the year 1807, England was solicited by Portugal and Spain to assist in defending those countries from the aggressions of the French; and a large military force was sent over to them, under the command of Sir Arthur Wellesley, whose important services and talents enabled Portugal to free herself from her enemy, and whose subsequent achievements and successes at Bassora, Almeida, Albuera, Talavera, and Vittoria, in Spain, were principally instrumental in obliging the French to evacuate that country likewise.

The British government having obtained information that the Danish fleet was to be placed under the control of France, a British fleet under Admiral Gambier, and a land force under Lord Cathcart, were sent to Copenhagen; and on the 7th of September, 1807, they obliged the Danish general to deliver up, by capitulation, their whole fleet, consisting of eighteen ships of the line, fifteen frigates, six smaller vessels, and twenty-five gun-boats, together with all the stores.

In 1808, the French power having prevailed to reduce Austria, Prussia, Russia, Holland, and the Italian states, to a state of humiliation, those countries were compelled to make peace with France, and to submit to the condition of resisting the introduction of English goods into any of their respective ports, with the view of ruining the commerce of this kingdom. But this state of things led to some consequences prejudicial to the French arms. The shutting up the continent from English commerce having

been enforced by the most arbitrary and oppressive conduct on the part of the French government, it was found intolerable, and the sacrifices required likely to have no end. Russia therefore abandoned her alliance with France, and this rupture induced Buonaparte to invade the Russian dominions, with a force of nearly 300,000 men; but on reaching the city of Moscow, and finding it burnt, so as to be inadequate to afford shelter to his army, he was compelled to commence a retreat in the depth of winter: harassed by the Russians on every side, his army was not only defeated, but almost annihilated, by the sword, sickness, and various calamities, arising from the inclemency of the season. The disastrous termination of the French expedition to Russia gave an opportunity for Austria and Prussia to adopt the same measures for abandoning their connexion with France, and they entered into an alliance with Russia. To destroy which, the French ruler, the following year (1813) collected a powerful army in Saxony; but being attacked by the allied powers, and defeated in the battle of Leipsic, was compelled to retreat to France, followed by the united forces of his enemies; who, undaunted and victorious, in their turn penetrated into the very heart of France, to seek and ensure peace to Europe, and in March 1814 took possession of its capital.

They entered Paris, however, not as conquerors, but as deliverers. The emperor of Russia and the king of Prussia were received by all ranks of the population with the most cheering acclamations. The senate having been called together on the following day, a provisional government was immediately nominated, and resolutions were adopted, declaring that the dynasty of Buonaparte was at an end. In April a new constitution was presented to the senate, which, after certain modifications, was adopted. It was accepted by the legitimate heir of the house of Bourbon, who had long been an exile, and who afterwards ascended the throne by the title of Louis XVIII.

Buonaparte, forlorn and almost unattended, was conducted to the island of Elba, where he remained for some time. After a few months' residence on the island, however, a correspondence was carried on between him and his partizans in France, which ended in his return thither at the head of what appeared to be an inconsiderable force. But such was the infatuation of the French people, and particularly of the army, that he marched without interruption to Paris, from whence the king had previously escaped; and for some time all ranks of people seemed to vie with each other in inviting again to the throne, a man who a few months before had quitted their country in disgrace.

This counter-revolution, however, was transitory as it was unexpected. It drew upon France the overwhelming force of the allies, which had but recently retired from it; and the results of the battle of Waterloo, in which the British arms took a conspicuous part, and which was fought in June 1815, were altogether without a parallel in history, whether we consider their intrinsic magnitude, their bearing on the peace and happiness of the world, or the rapidity with which they were accomplished. The Bourbons were by it once more restored to the throne of France—Paris again in the hands of the allies—and Buonaparte imprisoned for life in the isle of St. Helena, under the complete control of the British government, which he aptly styled, "the most powerful, the most constant, and the most generous of his enemies." After remaining in confinement for some years, a monument of the instability of human greatness, this extraordinary man expired May 5th, 1821.

But to return from a digression to which we have been led by the intimate connexion of the important events narrated with the destiny of Great Britain. Little worthy of record in so brief a sketch as the present took place during the remainder of the reign of George III. His Majesty had from long indisposition been unable to attend to the duties of his high station, and the prince of Wales had for some time held the reins of government, with the title of Prince Regent. His Majesty closed his long and eventful life on the 29th of July, 1820, in the eighty-second year of his age, and the sixtieth of his reign.

During the reign of his son and successor, George IV., the most remarkable event was the repeal of the laws relating to Roman Catholics, commonly called Catholic Emancipation. George IV. died June 26, 1830, and was succeeded by his brother, the duke of Clarence.

The principal circumstances which mark the reign of William IV. are the bills for Parliamentary and Municipal Reform—measures which promise to be of great and lasting importance to the interests of this country. William IV. died June 20, 1837, and was succeeded by our present youthful Queen.

Alexandina Victoria I. daughter of the duke and duchess of Kent, was born at Kensington, May 24, 1819, and proclaimed queen June 21, 1837. No events of so complete a character as to be worthy of record have as yet transpired, except the abolition of slavery in the West Indies, which took place August 1, 1838; an act of humanity which will do honour to her name, and which will appropriately close this brief history.

## CHAPTER VIII.

### CHRONOLOGY.

Chronology is that science which treats of the artificial divisions of time, and teaches us to adapt them to past transactions, in order to illustrate history.

Times are distinguished under various eras and epochs. An epoch is a point of time that begins eras, and concludes with some remarkable change of things. The first epoch of time, for instance, is said to have been that space which intervened between Adam and the flood; the second is from the flood to the days of Abraham.

An Era is a particular date or period, whence a series of years is computed; its origin is contested, though generally allowed to have had its rise in Spain. Sepulveda supposes it formed from A. E R. A. the note of abbreviation of the words *Annus E Rat Augusti;* occasioned by the Spaniards beginning their computation from the time their country came under the dominion of Augustus, or that of receiving the Roman calendar. We shall briefly notice the principal of these divisions of time.

*Era of the Olympiads.*—This method of computation had its rise from the Olmypic games, which were celebrated every fifth year, near the city of Olympia, in Peloponnesus. The first Olympiad commenced, according to some chronologers, in the year 3938 of the Julian period, the year from the creation 3174, the year before Christ 774, and 24 years, some will have 23 years, before the building of Rome. The Olympiads were also called anni Iphiti, from Iphitus, who instituted, or at least renewed the solemnity of the Olympic games. We do not find any computation by Olympiads after the 364th, which ended with the year of Christ 440, except that in a charter of our king Ethelbert, the years of his reign are said to be reckoned by Olympiads. This method of reckoning was followed by the ancient Greeks.

*Era of the building of Rome.*—This era took place A.M. 3197, and B. C. 752 or 753. This has also been called the Varronian epoch, being first introduced by Terentius Varro. The ancient Roman historians usually follow this epoch, which is referred to thus,

A.U.C. (that is, anno urbis conditæ, or the year of the building of the city.)

The eras or epochs, however, which are now chiefly in use, are the following, namely :—

*Epoch of the creation of the world.*—The number of years that elapsed from the creation to the birth of our Saviour, has never yet been satisfactorily ascertained by chronologers. It may here suffice to say, that the system most generally received is that of Archbishop Usher, who follows the computation of the Hebrew Bible, and fixes the creation of the world at 4000 years before the birth of Christ.

*The Christian era.*—Learned men have differed in opinion with respect to the exact time of the birth of Christ, some placing it four, others seven years earlier than the first year of the christian era. The uncertainty which exists upon this point, arises from the era not having been used until so many centuries had elapsed, that it was impossible to fix the date with accuracy. This is, however, of very little consequence in the application of this era to chronological purposes, for all are agreed as to the numerical date of every year; the year 1818, for instance, being universally received as the year 1818 of the christian era, although probably not the exact measure of the time which has elapsed from the birth of Christ. This era was invented about A.D. 527, by Dionysius Exiguus, a Scythian by birth, and a Roman abbot, who reckoned the first year of it to correspond with the 47th of the Julian period. This mode of reckoning from the birth of Christ, though recommended by every thing that could make it valuable, was not generally adopted till the commencement of the ninth century; a proof of the reluctance with which improvements, though in the highest degree necessary, were received in those dark ages.

*Era of the French Revolution.*—As this era is constantly referred to by French writers, during the time that France was under republican government, a few particulars concerning it may assist the reader's historical studies.

The era in question was substituted for the vulgar or christian era, in all public and civil instruments, by virtue of the decree, issued by the National Convention, on the 5th of October, 1793. It commenced with the epoch of the foundation of the republic, that is, on the 22d of September, 1792, of the vulgar era; on the morning of which day the sun arrived at the true autumnal equinox, at 18 minutes and 30 seconds past nine o'clock (Paris time.) This era was abolished by Buonaparte, and the christian era has been reestablished since 1806.

THE YEAR.—Chronologers have made use of two different sorts of years, the one taken from the course of the sun, the other from that of the moon. The first, called a solar year, is again divided into two, one of them is exact, and measures the entire course of the sun; it is called a tropical year, because it begins with the solstice, and determines in 365 days and nearly the fourth part of a day. The other is called a civil year, less accurate than the former, and subservient to popular uses.

The lunar year continues 354 days. This kind of year is now in use among the Arabians, Turks, and Saracens.

There are other marks and characters of time, or chronological terms, which ought to be explained, as cycle, epacts, &c. on account of their frequent use in history.

A cycle is a perpetual circulation and recurrence of the same parts of time. The origin of cycles was thus:—

The apparent revolution of the sun round the earth has been arbitrarily divided into 24 hours; the basis or foundation of all our mensuration of time. Civil use knows none but hours; or rather multiples of hours, as days and years. But neither the annual motion of the sun, nor that of the other heavenly bodies, can be measured exactly, and without any remainder, by hours, or their multiples. That of the sun is 365 days 5 hours 49 minutes, nearly. That of the moon, 29 days 12 hours 44 minutes. Hence, to swallow up these fractions in whole numbers, and yet in numbers which only express days and years, cycles have been invented; which, comprehending several revolutions of the same body, replace it, after a certain number of years, in the same points of the heavens, whence it first departed: or, which is the same thing, in the same place of the calendar.

Such is the famous cycle of 19 years, called also the cycle of the moon, or lunar cycle, a period of 19 solar years; equivalent to 19 lunar years and 7 intercalary months: in which time the new and full moons are supposed to return to the same day of the Julian year.

This is also called the Metonic period, from its inventor Meton the Athenian, and the golden number; though in propriety the golden number is rather that particular number which shows the year of the lunar cycle any given year is in. This cycle of the moon only holds true for 312 years; for though the new moons do return to the same day after 19 years, yet not to the same time of the day, but near an hour and a half sooner; which error, in 312 years, amounts to an entire day. Yet those employed in reforming the calendar went on a supposition of the lunations returning precisely from 19 to 19 years for ever.

The use of this cycle in the ancient calendar is to show the new moon in each year, and the time of Easter. In the new one it only serves to find the epacts; which show, in either calendar, that the new moons fall 11 days too late.

The cycle of the sun, or solar cycle, is a revolution of 28 years, beginning with 1, and ending with 28; which being elapsed, the dominical or Sunday letters, and those that express the other feasts, &c. return into their former place, and proceed in the same order as before. It is called solar cycle, not with regard to the sun's course, which has nothing to do with it, but from Sunday, anciently called *dies solis*, the day of the Sun, because the dominical letter is principally sought for from this revolution; the dominical letters of which are the first in the alphabet, having been substituted in lieu of the mundinal letters of the Romans.

The reformation of the calendar under Pope Gregory occasioned a considerable alteration in the cycle; in the Gregorian calendar the solar cycle is not constant and perpetual, because every fourth secular year is common, whereas in the Julian it is bissextile. The epoch or beginning of the solar cycle, both Julian and Gregorian, is the ninth year before Christ.

*A Julian year* is a solar year, containing, commonly, 365 days; though every fourth year, called bissextile, contains 366. The astronomical quantity, therefore, of the Julian year, is 365 days 6 hours, which exceeds the true solar year by 11 minutes; which excess, in 131 years, amounts to a whole day; and thus the Roman year stood, till the reformation made therein by Pope Gregory.

*Epacts.*—The number of days added to the lunar, to make it equal to the solar, year: they are either annual or menstrual.

Hence, as the Julian year is 365 days 6 hours, and the Julian lunar year 354 days 8 hours 41 minutes 38 seconds, the annual epact will be 10 days 21 hours 11 minutes 22 seconds; that is, nearly 11 days. Consequently, the epact of two years is 22 days; of three years, 33 days; or rather three, since 30 days make an embolisimic, or intercalary month.

Thus the epact of four years is 14 days, and so of the rest; and thus every 19th year the epact becomes 30 or 0; consequently the 20th year, the epact is 11 again; and so the cycle of epacts expires with the golden number, or lunar cycle, of 19 years, and begins with the same.

Months and Days.—*January* is the first month in the year among the western nations. The word is derived from *Januarius*, a name given it by the Romans, from *Janus*, one of their divinities, to whom they attributed two faces; because on the one

side the first of January looked towards the new year, and on the other towards the old one. The word Januarius may also be derived from *janua*, a gale; for the first month is as the gale of the year. Numa Pompilius made January the first month; Romulus's year beginning in the month of March.

*February* is derived from *Februa*, an old Latin word; for, from the very foundation of the city, we meet with *februa* for purification; and *februare* to purge or purify. In this month the Romans held a feast in behalf of the manes of the deceased; and Macrobius tells us, that in this month also sacrifices were performed, and the last offices were paid to the defunct.

*March* (the third month according to our computation) was considered as the first by some of the ancients, and by others as the third, fourth, or fifth, and even the tenth month of the year. Romulus named it after his supposed father, Mars, and appointed it as the first month of the year.

*April* (in Latin *Aprilis*) is derived from *Aperio*, I open; because the earth in this month begins to open her bosom for the production of vegetables.

*May*, the fifth month, was called *Maius*, by Romulus, from respect to the senators and nobles of the city, who were called *Majores:* though others say it was so called from *Maia*, the mother of Mercury, to whom they offered sacrifice in this month.

*June*, by the Romans called *Junius*, in honour of the Roman youth who served *Romulus* in war; some derive the word *Junius* from Juno.

*July* is the seventh month; the word is derived from the Latin *Julius*, the surname of C. Cæsar, the dictator, who was born in this month. Marc Antony first gave this month the name of July, which was before called *Quintilis*, as being the fifth month of the year in the old Roman calendar. For the same reason August was called *Sextilis;* and September, October, November, and December, still retain their original names.

*August*, in a general sense, implies something majestic, and the appellation was first conferred on Octavius by the Roman senate. Octavius, then named Augustus Cæsar, was in this month created consul; he had thrice triumphed in Rome, subdued Egypt to the Roman empire, and terminated the civil wars: on this account the month was dedicated to his honour, and is still called after his name.

*September*, from *Septimus*, the seventh month, reckoning from March, which was the first month of the ancients. The Roman senate would have given this month the name of *Tiberius*, but the emperor opposed it. Under other emperors it had other names; but at present they are all disused.

*October*, the eighth month in the year in Romulus's calendar, though the tenth in that of Numa, Julius Cæsar, &c. October has still retained its name, notwithstanding all the names the senate and the Roman emperors would have given it: as Faustinus, Invictus, and Domitianus.

*November* was the ninth month in the year of Romulus, (whence its name) but it is the eleventh month of the Julian year.

*December*, from *decem*, ten; it being assigned by Romulus as the tenth month in the year. It is now the last, wherein the sun enters the tropic of Capricorn, and marks the winter solstice.

*Months* are solar or lunar:—A solar month is the space of time within which the sun moves through one entire sign of the ecliptic. A lunar periodical month is the space of time wherein the moon makes her round through the zodiac, or wherein she returns to the same point.

*The Old Style* is the Julian manner of computing time, and agrees with the Julian year, which contains 365 days 6 hours. The Gregorian, or New Style, agrees with the true solar year, which contains only 365 days 5 hours and nearly 49 minutes. In the year of Christ 201, there was no difference of styles, but there is now a difference of eleven days between the old style and the new, the latter being much before-hand with the former.

At the diet of Ratisbon, in 1700, it was decreed by the body of protestants of the empire, that eleven days should be retrenched from the old style, in order to accommodate it to the new, and the same regulation has since passed into Sweden, Denmark, and England; where it was established by Geo. II. c. 23, which enacts that the supputation, according to which the year of our Lord begins on the 25th day of March, shall not be used from and after the last day of December 1751; and that from thenceforth the first day of January every year shall be reckoned the first day of the year; and that the natural day next immediately following the second day of September 1752, shall be called and reckoned the fourteenth day of September, omitting the eleven intermediate days of the common calendar; and that the several natural days succeeding the fourteenth day shall be called and reckoned in numerical order. The adoption of the Gregorian computation accordingly took place in 1752, and is now recognised throughout the kingdom.

# CHAPTER IX.

## GEOGRAPHY.

GEOGRAPHY instructs us in the form of the globe we inhabit, and describes its constituent parts, as well as the nations and kingdoms of which it is composed. To the utility and importance of this study, the experience of every one must bear testimony. Without some practical acquaintance with it, the ordinary intercourse and affairs of society could not be carried on; and, accordingly, traits of this study are to be found in the earliest accounts of the human race. In the Scriptures we are told that Moses, upon approaching the promised land, laid before the rulers of the Israelites a description of the several districts each tribe was to occupy. The Phœnicians, the earliest navigators of whom we have any proper accounts, must likewise very early have contrived methods of laying down the coast of the countries and islands to which, for commercial purposes, they were accustomed to resort. The first account, however, upon record, of any thing corresponding to our modern maps, is that conveyed to us by our great masters in knowledge of every kind, the Greeks. By their historians we are told that Thales, or rather his successor Anaximander, about 600 years before our Saviour, produced a draught or map, on which were laid down the positions of Greece and its adjoining countries. After Anaximander, came a succession of geographers among the Greeks, of whose writings, in general, only imperfect fragments have come down to our hands. At last, in the reign of Augustus Cæsar, about the year 19 of our Lord, appeared Strabo, a native of Lesser Asia, near the Black Sea, who, profiting by the information collected by scientific men, employed by Julius Cæsar, the illustrious predecessor of Augustus, composed a general system of geography, which has happily been preserved tolerably entire to our days. This work, besides geographical and historical information concerning such quarters of the globe as were then known, many of which the author had himself visited, contains a number of curious inquiries relative to disputed points, and extracts from the writings of his predecessors, which, but for Strabo's works, would now be utterly unknown. Fifty years after Strabo, Ptolemy of Alexandria


ARCTIC OCEAN
BAFFIN'S BAY
GREENLAND
ICELAND
NORTH AMERICA
BRITISH TERRITORY
HUDSONS BAY TERRITORY
UNITED STATES
NORTH ATLANTIC OCEAN
PACIFIC OCEAN
SOUTH AMERICA
SOUTH ATLANTIC OCEAN
EUROPE
RUSSIA
ASIA
RUSSIAN EMPIRE
CHINESE EMPIRE
INDIAN OCEAN
AUSTRALIA
SOUTHERN OCEAN
ANTARCTIC OCEAN
THE WORLD,
ON MERCATOR'S PROJECTION.

in Egypt, published a treatise containing directions for the construction of maps, adapted to the globular form of the earth, and to the positions of places with respect to latitude and longitude.

The inconsiderate and uninformed portion of mankind have been of opinion that the earth is a vast extended plane surface, bounded on all sides by the sea or the heavens. More attentive and sagacious observers, however, were long ago persuaded that the earth is a round ball or globe, maintaining its appointed station among the innumerable bodies composing the universe, and far removed from contact with any other body, of either the same or a different kind. The globular or spherical form of the earth may be argued from the following facts. When we stand by the side of a large piece of water, of several miles in breadth, and fix our eye carefully on such objects, on the opposite side of the water, as just appear along its surface, if we stoop the eye downwards, the objects we saw on the surface will gradually seem to sink below the water, and at last entirely disappear. On the other hand, if, by ascending an eminence, we raise the eye above its former position, we shall gradually discover new objects, rising above the surface of the water, and which will, in the same order, successively disappear below the surface, as we descend to our original station. These appearances can be accounted for no other way, than by supposing the surface of the water to be a portion of the rounded surface of the globe; and the fact may be easily ascertained, by an experiment on any body of a globular shape. In every eclipse of the moon, occasioned by our earth coming between her and the sun, the shadow on her body is invariably circular; consequently the body, thus intercepting the light, must be circular in all directions. Were the earth a circular, thin plane, as has been supposed, the shadow could not be always of the same shape; but that the earth is a globe or sphere, is placed beyond all possibility of doubt, by the voyages repeatedly performed round the world, from the port of departure to the same port again. Such voyages are utterly inexplicable, unless the seas on which they pursued their course had been spread out upon the surface of a ball or globe.

When, however, measurements for the purpose of determining the dimensions of the earth were made in places at great distances asunder, the results were so far from agreeing with one another, that inquirers began to suspect our ball, though of a globular shape, not to be a perfect sphere. If you whirl a key at the end of a string round your finger, the key acquires a motion, by which, if not hindered by the string, it would fly off to a considerable distance. Just such an effect is produced on the globe of the earth in its

motion round itself once in twenty-four hours. The parts at the greatest distance from the points round which it turns move with much greater velocity. If a ball of soft loose materials were rapidly whirled round upon an axle, the particles would have a tendency to fly off, and would swell out and accumulate towards the middle of the ball, gradually leaving the parts near the axle. After some continuance of this rapid whirling, the ball, which was at first a perfect globe, would assume a different form, resembling, in some measure, that of an orange revolving round a wire passing through the middle of its flattened sides. From a consideration of this and some other facts, our immortal countryman, Sir Isaac Newton, demonstrated that, if the earth were pierced through the centre, by a line from the middle of the flattened sides, it would be about 35 English miles shorter than a similar line carried at right-angles to the first, passing through the swelling surface of the globe; and his doctrine has been admirably confirmed by repeated measurement of parts of the earth's surface. It appears that, if it were a perfect sphere, its axis, in whatever way it passed through the centre, would be about 7930 English miles, making the circumference about 24,913 miles: the 360th part of one degree would then contain 69.2 English miles. It appears, however, that where the earth has the greatest diameter, a degree of her circumference from west to east contains nearly $70\frac{2}{3}$ English miles. It will occur to the reader that when the surface of the earth is described as a globe or sphere, no allowances are made for the inequalities produced by mountains of even the greatest elevation, but the highest mountains in the world would not stand more than a quarter of an inch above its general surface: in speaking of the globular surface of the earth, therefore, the inequalities upon it, in heights and hollows, may safely be neglected.

When we observe the sun, moon, and other heavenly bodies begin regularly to appear, or rise, as we call it, in the east; advance to their greatest elevation, and then sink down and at last disappear or set in the west; it is natural for us to imagine them to be really in motion from east to west, whilst we on the earth are perfectly motionless. The traveller in a boat descending a river, moving swiftly forward, is apt to think that the trees, houses, and other objects on either hand, are rushing quickly by in a direction contrary to its course. Experience, however, soon corrects this error. In the same way, more extended views of the nature of the visible universe, and of the magnitudes and distances of its component parts, will lead us to account for their apparent motion in a way infinitely more simple, and suitable to the ordinary course of nature. Were the sun to revolve round this earth once in every twenty-

four hours, such is the extent of the circle he would have to travel, that it would demand a rapidity of motion utterly beyond our comprehension. The circumference of the orbit in which he would move would be nearly 597 millions of miles, which will give 34,540 miles for every second of time. Now supposing the earth should turn once round upon herself, all the appearances of the twenty-four hours would be completely exhibited, and that in a manner admirably simple and easy. The circumference of the earth where greatest, and where, in her revolution, the parts move with the greatest velocity, is about 25,430 English miles. A point in her surface in that quarter must, by her turning once round in twenty-four hours, move at the rate of 518 yards (not a third of a mile) in one second. When we consider the prodigious difference of rapidity between this and the former rate, it is impossible that any rational being can refuse his assent to the opinion, that the various appearances brought before us in the course of a day are produced, not by the inconceivably rapid circulation of the whole heavens, but by the simple, easy, and comparatively slow turning of the earth itself, upon its own axis.

An observer on board a ship, bound for India, perceives, as he quits the English shore and advances southwards to the Cape of Good Hope, that the sun comes daily more and more over his head at noon, and at last arrives at a point perpendicularly above him. Continuing on his course, the sun shines from the north. Having turned round the Cape, he directs his course northerly, bringing the sun at noon more and more over him, and at last, before he arrives at Calcutta, has the sun again on his south side, as it was before he left England. This appearance is not peculiar to the sun ; for as the traveller proceeds southwards, he will gradually discover, along the surface of the ocean, stars never before visible, whilst others in the northern quarter retire below the horizon. The north pole star itself will, when he arrives at the equinoctial line, sink into the waters behind him. This will continue until he double the Cape of Good Hope, where, steering northward, the south pole will be lost, and the northern heavens return to his sight. All who have sailed round the earth have followed an eastern or a western course : but were it not for the immense bodies of ice upon the seas in the northern and southern regions of the globe, voyages might be equally performed by courses north or south. These facts establish beyond a doubt that the earth is a globe or spherical body, totally detached from every other body by which it can be supported, like the child's soap-bubble, and maintained in its place in the universe by causes and laws impressed upon it, and all the other heavenly bodies, at the moment of the creation.

If through the flattened sides of an orange we pass a long wire, and make the orange revolve round it, we shall have an idea of the way in which the earth turns upon itself. Not that in the earth any such material axis exists, but to this imaginary axis we give a name, borrowed from other machines, of which we have a knowledge. The points where this imaginary line comes to the surface of the globe, are termed poles, from a Greek word signifying to turn round. If this axis be supposed to extend both ways till it seem to touch the surrounding heavens, it will mark out two other points for the poles of the world; for round the imaginary axis, extending between these latter points, the whole universe appears to revolve, while the points themselves remain unmoved. That point which is visible from one side of the globe, we call the north pole; and the opposite point, the south pole. If we divide the space between the north and south poles into two equal parts, and conceive a line to be drawn quite round the globe, it will divide the globe in two equal parts, hence called hemispheres, *i.e.* half-spheres; it is therefore termed the equator.

The distance of any place on the globe east or west from a given position is termed its longitude (length), and its distance north or south from a given position is called its latitude (breadth). Latitude is reckoned from the circle begirting the globe, *i. e.* the equator, and is called north or south latitude, according to the position of any place on the north or south side of the equator. The circumference of the globe is divided into 360 degrees: the distance between the poles contains 180 degrees, and that from either pole to the equator contains 90 degrees: consequently no place can be more than 90° of latitude either way. Longitude is not of the same fixed nature, because there is no point fixed on the globe from which it must be reckoned; it is now the practice for the inhabitants of different countries to count from the position of their own capital or other noticeable place. Longitude is reckoned east or west upon the equator, and is counted one half, or 180°, eastward, and the other half, 180°, westward. The line supposed to extend over London from pole to pole is called the meridian, from a Latin word signifying mid-day; because, when the sun comes upon that line, it is then noon or mid-day at that place, and the sun is at his greatest apparent elevation. The meridian from which longitude is counted, is called the first meridian. An observatory has been erected on an eminence in Greenwich Park, where a regular series of observations has long been carried on by astronomers of the first eminence, with instruments not to be matched elsewhere in the world. For this reason, it is now the established practice to reckon longitude from the point where the meridian passing over Greenwich observatory intersects the equator; and it

is thence considered the first meridian for the British empire. In France longitude is counted from the meridian passing over the observatory situated adjoining to the south side of Paris. In Spain it is reckoned from the observatory of the Naval Academy in Cadiz.

Latitude being reckoned both ways from the equator for 90° to the poles, if the position of the centre of London be compared with the north pole, and the equator, upon the meridian, it will be found to be 51 degrees 30 minutes and 49 seconds to the north of the equator; consequently London is said to be situated in 51° 30′ 49″ of N. latitude. The first meridian of British geographers passes from the N. pole over Greenwich, through the western parts of France and eastern parts of Spain, and across the continent of Africa, traversing the coast of Guinea near Cape Coast castle, and cuts the equator about 8 degrees 14 minutes west from the island of St. Thomas, situated close to that line. If we wanted, therefore, to know the longitude of any place with respect to the meridian of Greenwich, we would carry the meridian of the place in question down to the equator, and there count how many degrees, minutes, &c., were intercepted between it and the first meridian; noting at the same time whether it lay to the eastward, or to the westward of it. Thus the meridian of the observatory of Paris will be found to cross the equator 2 degrees 19 minutes 51 seconds to the east of the first meridian: it is therefore said to be in 2° 19′ 51″ of E. longitude from Greenwich.

The difference of latitude between two places is known by subtracting the lesser latitude from the greater, when both places lie on the same side of the equator: but by adding them together when they lie on opposite sides, because the latitude is counted both ways from the equator. Thus, to know the difference of latitude between London and Edinburgh, we subtract the latitude of London 51°. 30′ 49″ from that of Edinburgh 55° 57′ 5″, when the difference of latitude is 4° 26′ 16″. On the other hand, to find the difference of latitude between Portsmouth observatory in North latitude 50° 48′ 3″, and the Cape of Good Hope in south latitude 34° 29′, on opposite sides of the equator, we add their quantities together, and the sum 85° 17′ 3″ is the difference of latitude. Again, to find the difference of longitude between two places on the same side, and within 180 degrees of the first meridian, we subtract the less from the greater; thus to find the difference of longitude between Paris observatory, situated in 2° 19′ 51″ E. longitude from Greenwich, and Constantinople, in E. longitude 28° 55′ 5″, we subtract the former from the latter, when the difference of longitude is 26° 35′ 14″. But when the two

places lie on opposite sides of the first meridian, the two sums of longitude must be added together, for the difference. . Thus the difference of longitude between Cadiz, in longitude 6° 17′ 35″ W. from Greenwich, and Vienna in longitude 16° 16′ 22″ E. from Greenwich, will be 22° 33′ 57″, &c.

The constituent parts of the earth are LAND and WATER: the latter occupying about seven-tenths of the whole surface of the globe; and the former rising in all imaginable varieties above its surface.

The denominations of the several parts of land are—Continents, Islands, Peninsulas, Isthmuses, Promontories, Capes, Coasts, Mountains, &c.

A *Continent* is a large tract or portion of land, containing several countries, empires, kingdoms, or states, without an entire separation of its parts by water; as Europe, Asia, Africa, or America.

An *Island* is a less portion of land, entirely surrounded by water; as Great Britain or Ireland.

A *Peninsula* is a tract of land, surrounded by water except at one point, where it is connected with a neighbouring continent; such are Spain, the Morea in Greece, and even Africa itself, which, though called a continent from its extent, has the stronger features of a peninsula.

An *Isthmus* is a neck of land, forming a communication between a peninsula and a continent; as the Isthmus of Suez, which unites Africa to Asia; or the Isthmus of Darien, which connects North and South America.

A *Promontory* differs but little from a peninsula, except that its base is united to the main without the intervention of an isthmus; such are Italy, Mysore in India, and California in North America.

A *Cape* is a hill, or point of land, terminating a promontory, as the Cape of Good Hope. The terms Point, Head, Mull, &c., are also applied to remarkable portions of land, stretching out into the ocean; as the Lizard Point, Flamborough Head, &c.

A *Coast*, or *Shore*, is that part of a country which borders on the sea; as the Coast of Guinea.

A *Mountain* is any considerable elevation on the earth's surface. The name is applied as well to detached heights as to connected groups, the last of which are called Chains of Mountains. They are composed of vast masses of rock, that appear to descend almost perpendicularly into the body of the earth, and are destitute

of shells or other organized marine matter. Of this kind are the Pyrenees, the Alps, the Appennines, &c. in Europe; the Riphæan Mountains, Caucasus, Taurus, and Libanus, in Asia; the Mountains of the Moon, in Africa; the Apalachian chain and the Andes, in America. Another class of mountains, called volcanoes, or burning mountains, comprises such as are more detached, or surrounded by groups of lower hills, of which the soil, composed of gravel and other loose materials, appears to be heaped up in a disorderly manner. Many of these are truncated, or have an opening, shaped liked a funnel, towards their summits, which are composed of, or surrounded with, heaps of calcined and half vitrified bodies, lava, &c. indicative of their volcanic origin. Such, among many others, are mounts Ætna and Vesuvius, in Sicily and Naples; Adam's Peak, in the island of Ceylon; the Peak of Teneriffe, in the Canary Isles, &c.

A *Plain*, or *Down*, is a level surface of the earth, destitute of trees. If of great extent, and altogether without the large vegetables, it is called, in Europe and Asia, a Steppe; in America, a Savannah, or Pampa. If much elevated, and terminated on all sides by declivities, it is denominated a Plateau, or Table. The middle regions of Spain, the central parts of Asia, and the elevated lands of Mexico, are of the latter description.

An *Oasis* is a fertile district amidst vast deserts of sand, like an island in the ocean. Several occur in the great desert of Africa.

As the earth is divided by water into various parts; so the water, by the intervention of the land, is separated into equally distinct portions, all of which have their peculiar designations; as Oceans, Seas, Lakes, Straits, Gulfs, Bays, Rivers, &c.

An *Ocean* is an immense collection of water, without any entire separation of its parts by land; as the Atlantic, or Western Ocean, which divides the Eastern continent from the Western; the Pacific, which separates America from Asia; and the Indian Ocean, which lies between Africa and the Eastern Peninsula of India.

A *Sea* is a smaller collection of water, communicating with the ocean, but confined by land on each side within narrow bounds; as the Mediterranean, the Black Sea, &c.

A *Strait* is a narrow part of a sea, by which the latter communicates with the ocean, or with another sea; as the Strait of Gibraltar, which forms a junction between the Mediterranean and the Atlantic; or the Strait of the Dardanelles, which affords a communication between the Sea of Marmora and the Archipelago.

A *Lake* is a large collection of water, entirely surrounded by land:

as the Lake of Geneva and the Caspian Sea; for the latter, though denominated a sea, from its immense size, is in reality a large lake.

A *Gulf* is an arm of the sea running up into the land, and generally narrower at the entrance than within; as the Gulf of Venice; the Persian Gulf; and the Gulf of Mexico. If a Gulf be very large, it is called an Inland Sea, as the Mediterranean. If it do not extend far inland, and be open at its entrance, it has the denomination of a Bay, as the Bay of Biscay, or the Bay of Bengal. When very small, it is called a Harbour, Haven, Cove, Creek, Lough, Frith or Firth, Road, Sound, or Bight; as Falmouth Harbour in Cornwall; Milford Haven in Wales; the Cove of Cork, and Belfast Lough, in Ireland; Solway Firth, between Cumberland and Scotland; Plymouth Sound, in Devonshire; and the Bight of Benin, in the Gulf of Guinea.

An *Archipelago*, generally, is any part of the sea containing numerous islands; particularly, the term is applied to that part of the Mediterranean which lies between Greece and Anatolia, or Asia Minor.

A *River* is a considerable body of flowing water, collected in the more elevated parts of land, and descending to the lower, discharging itself into the sea, or into some other river, which conveys the united stream to the ocean; as the Thames, in the former case, or the Derwent, in the latter. The longest river in Europe is the Danube (estimated at 1833 English miles); in Asia, the Enesei (3580 miles); in Africa, the Nile (3240 miles); and in America, the Mississippi and Missouri (3760 miles).

Our globe is divided into two vast masses, called the Eastern, or Old Continent, and the Western, or New; besides innumerable detached portions, denominated Islands, of almost all figures and dimensions.

The Eastern Continent is subdivided into three unequal portions, called EUROPE, on the north-west; ASIA, on the north-east; and AFRICA, on the south. The Western Continent consists of AMERICA, North and South, each a continent in itself, but united by a neck of land, called an isthmus, and forming the fourth division of the globe. Besides these, there is, south-east of Asia, a vast mass of land, called Australia, or New Holland, which, though detached, and surrounded by water, has been thought by some geographers to merit the appellation of a continent. This, with its surrounding groups of islands, constitutes a distinct geographical division under the name of Australasia. And the numerous islands scattered about the wide expanse of ocean which separates the eastern shores of Asia from the western borders of America, form another division, under the title of Polynesia. The two latter are now considered as forming together a new or fifth grand division of

the globe, under the term of OCEANICA. The total population of the world is estimated at 841 millions.

## EUROPE.

Europe is bounded on the north by the Frozen Ocean, on the west by the Atlantic Ocean, on the south by the Mediterranean Sea, and on the east by the continent of Asia, extending about 3000 miles in length, from Cape St. Vincent in the west to the river Oby in the north-east; and 2500 in breadth, from the North Cape of Norway to Cape Metapan in the Morea; lying between the 36th and 72d degrees of north latitude, and containing about 160,000,000 inhabitants.

The chief islands of Europe are Great Britain and Ireland, Iceland, Zealand, Sicily, Sardinia, Corsica, Candia, Majorca, Minorca, the Ionian Islands, and the Archipelago, or Greek Islands.

The chief inland seas are the Mediterranean, the Baltic, the Black Sea, and the White Sea.

Its principal rivers are, the Volga, or Wolga, the Danube, the Vistula, the Don, the Dnieper, the Rhine, the Elbe, the Tiber, the Tagus, and the Thames; the principal lakes are, the Ladoga, and Onega, Geneva, Constance, Como, Lough Neagh, and Loch Lomond.

The most elevated mountains in Europe are, the Alps, the Pyrenees, the Appennines, the Carpathian, and the Dofrefeld.

The volcanoes, or burning mountains, are, Vesuvius and Stromboli, in Italy, Mount Ætna in Sicily, and Mount Hecla in Iceland.

Its principal capes are, the North Cape, the Naze of Norway, the Land's End, Cape La Hogue, Finisterre, St. Vincent, and Trafalgar.

Except in Turkey, where the people are Mahometans, and in some parts of Lapland, where paganism prevails, the Christian religion is universally professed in Europe; divided, however, into the Catholic, the Greek, and the Reformed Churches.

The principal countries of Europe are, Sweden, including Lapland and Norway, Denmark, Russia, including Poland, Prussia, Germany, Austria, Holland, Belgium, France, Switzerland, Italy, Portugal, Spain, Turkey, Greece, and the United Kingdom of Great Britain and Ireland.

SWEDEN.—This country, together with Lapland and Norway, forms one kingdom. The climate is cold but healthful, and the country mountainous, abounding in lakes, forests, and valuable mines of copper and iron. The mines and forests are the principal sources of its wealth. The Swedes are brave and learned;

but their native energies are repressed by the narrowness of their means, and their neighbourhood to the powerful empire of Russia. The principal towns are, Stockholm, the capital, Upsal, famous for its university, Gothenburgh, in Gothland; Tornea, in West Bothnia; and some others of inferior note. Sweden and Swedish Lapland abound with natural curiosities, and with singular and truly sublime scenery. The total population of Sweden, including its dependencies, is about 41,000,000.

*Lapland* is covered with vast forests of pines, affording, however, some spots for pasture and cultivation. The character of the natives is hospitable and generous; they derive their chief comforts from their rein-deer, by means of which they subsist, travel, and are clothed.

*Norway* was formerly a kingdom of itself; it was then for many years dependent on Denmark, but by a more recent arrangement is now ceded to Sweden. The chief towns are Bergen and Christiana.

Denmark.—It consists of the peninsula of Jutland, duchy of Sleswick, on the continent, the islands of Zealand, Funen, Langeland, Laaland, Falster, Bornholm, and Moen, besides two states of the German confederacy, viz. the duchies of Holstein and Lauenburgh. To the Danish kingdom also belong the Faroe Islands, Iceland, the western coast of Greenland, some places in Guinea, and the city and territory of Tranquebar in the East Indies. The country is mostly flat, and abounds with bogs and morasses. It produces corn, timber, cattle, iron, fish, and different kinds of naval stores. It has the chief command of the Baltic, which gives it some importance. The principal town is Copenhagen, which stands on the island of Zealand. The Danes are a peaceable and hardy race, but possess far less enterprise than their ancestors, who were once the terror of the more southern nations of Europe, and established their rule in Britain. Their religion, like that of the Scandinavian nation in general, is Lutheran. Iceland abounds in sulphur, subterraneous fires, volcanoes, hot springs, &c. Hecla in Iceland is a volcanic mountain a mile high, the top of which is always covered with snow. Greenland is famous for its whale fishery, but it is too cold to be inhabited by civilized man.

Russia.—The Russian empire, which is the largest in the world, comprehends all the more northern parts of Europe, besides its possessions in Asia. In Europe only it is reckoned 1500 miles long, and 1,100 broad; but notwithstanding its extent, it is but

thinly peopled, and a large portion of the inhabitants are still very uncivilized. The population has been estimated at 50,000,000. It contains at present fifty-one provinces, of which forty-one and part of four others are in Europe, Asiatic Russia containing six whole provinces, and the remainder of the four frontier provinces. It is bounded on the north by the Northern Ocean; on the south, by Austria, the Black and Caspian Seas, and Tartary; on the east, by the Northern Pacific Ocean; and on the west, by Sweden and the Baltic. In the northern parts of Russia the climate is intensely cold; but in the more southern parts, neither the climate nor the soil are ungenial. The face of the country is flat, with some mountainous districts. The great natural feature of European Russia is its steppes, which are immense plains formed in great part of sand, with little wood except stunted birches. In some parts the mixture of salt with the soil, in others the want of water, renders these levels unfit for cultivation. They extend throughout the south as well as the north. The principal cities and towns are Petersburgh, the modern capital, built by Peter the Great; Moscow, the ancient capital, a few years ago destroyed in the French campaign in Russia, but now rebuilt, and rapidly rising to wealth and importance; Archangel, on the borders of the White Sea; Cherson, on the Black Sea; Astrachan, near the Caspian; Warsaw, the capital of Poland; and Tobolsk, the capital of Siberia. The Russian government has long been a monarchy, with power unlimited, except by the respect due to the nobility and clergy; the people being in a state of vassalage, and wholly unqualified to bear a part in governing themselves. The title of the sovereign, formerly grand prince, was changed by Peter I. to emperor and autocrat of all the Russias. The Russian government was declared by Alexander to be a constitutional monarchy, and the senate has the right of remonstrating against any ukase or edict contrary to law; a power as yet only ostensible from the absence of public opinion in this country.

The productions and exports of Russia are furs, leather, sail-cloth, sheeting, hemp, flax, timber, iron, copper, pitch, tar, and cordage. The fisheries are also very considerable. Agriculture is in a very backward state. The great variety of climate in Russia implies a corresponding difference of products. Rye, barley, and oats, are the grains of the northern provinces, wheat being cultivated only in the south. The principal rivers are the Volga, which, after winding a course of 2,000 miles, discharges itself into the Caspian Sea; the Don, or Tanais, the Dnieper, the Dniester, the Dwina, and the Vistula. The Uralian mountains, extending from north to south, divide European Russia from

Asiatic Russia and Siberia. The inland navigation is extensive, as goods may be conveyed by water nearly from Petersburgh to China.

Poland.—Formerly an independent kingdom, but now almost annihilated from among the nations of the earth. It was bounded north by Prussia, east by Russia, west by Germany, and south by Hungary and Moldavia. In its highest prosperity it contained an area of 284,000 square miles, and a population of about 15,000,000; but it has gradually been reduced in extent, and incorporated with its more powerful neighbours, Russia, Austria, and Prussia; till, in its political character, it can hardly be said to exist, and its very name has almost disappeared from the map of Europe. At the settlement of the continent in 1815, after the overthrow of Buonaparte, a small portion of the original territory of Poland, with an area of about 47,000 square miles, and a population of 3,000,000, was erected into a separate kingdom, subject to the emperor of Russia, but governed by its own laws. It consisted of the central provinces of Poland, bounded by the acquisitions of Russia, Austria, and Prussia, and was divided into the eight palatinates of Cracow, Sendomir, Kalisch, Lubin, Plock, Masovia, Podlachia, and Augustow. By the liberal policy of the Emperor Alexander, who seems to have desired that the Poles should not lose entirely their national character and independence, a constitutional charter was framed in 1815. It consisted of a king, a senate, and a diet. This state of things lasted for several years, till the accession of the Emperor Nicholas, whose despotic line of policy towards the Poles roused them again to resistance. In 1833 they flew to arms, and made a noble effort to gain their independence; but the overwhelming force which Russia was able to bring against them rendered the struggle ineffectual, and has only ended in their destruction.

The face of the country is generally flat, the climate is rather cold, but the soil is productive in corn and other articles of export. The principal rivers are the Vistula, and the Neister or Boristhenes. As for the character of the Poles, the nobles are generous and brave, and the inhabitants generally, in the late conflicts with Russia, manifested extraordinary courage and energy in defence of their liberties.

Prussia.—This kingdom, erected under Frederic the Great, has in various instances exhibited energies which have astonished Europe. In 1741 it consisted only of Brandenburg and of Royal and Ducal Prussia. Frederic then wrested Silesia from Austria, and afterwards by the partition of Poland, acquired a large portion

of that country. By the war which Prussia commenced against France in 1806, she at first lost half her territory; but after the triumph of the combined armies in 1814, she regained nearly all she had lost, with the addition of fresh possessions in Saxony, Westphalia, and the Grand Duchy of the Rhine. The kingdom now consists of the following parts. 1. In Germany: Brandenburg, Pomerania, Silesia, Saxony, Westphalia, Juliers, Cleves and Berg, and the Lower Rhine.—2. Not in Germany: East Prussia, West Prussia, Posen. The king of Prussia is also sovereign of Neufchâtel in Switzerland. The population, at the end of 1827, according to the official returns, amounted to 12,552,278. The general face of the country is level, the soil is fruitful in corn, and the climate mild. One of the most remarkable productions of this country is yellow amber, which is found along the sea-coast. There are a great number of mechanics, but the principal business is husbandry and the feeding of cattle. The Prussians have a strong resemblance to their neighbours the Germans; are a manly race, and, when led by able generals, have performed prodigies in war. The chief towns are, Berlin, the capital, Dantzic, Königsberg, Magdeburg, and Breslau. The universities are four in number; viz. Berlin, Halle, Breslau, and Königsberg, and there are in these and at Dantzic, Magdeburg, and a number of other towns, academies (under the name of gymnasia, colleges, or high schools,) in which are taught partly the classics and mathematics, but more especially the modern languages, drawing, and other accomplishments. The principal rivers are the Vistula, the Memel, the Oder, and the Elbe.

Germany was formerly divided into nine great circles, consisting of an infinite number of independent states, all, however, bearing a nominal subjection to its head, the emperor of Germany; but it is now subdivided into so many states, that a clear, definite limitation of what is meant by Germany, is attended with difficulty, and is called "the stumbling-block of geographers." By the overwhelming power of France, a few years ago Germany was parcelled out into various separate states, the principal of which were the kingdoms of Saxony, Westphalia, Bavaria, and Wirtemburg. After the overthrow of the French power in Europe, a new arrangement was settled by the Congress at Vienna. So far as it regards its relations to foreign powers, Germany has been formed into one great body, termed the Germanic Confederation, the objects of which are the maintenance of external and internal safety in Germany, and the independence and inviolability of the confederated states.

The affairs of the confederation are confided to a federative diet, in which all the members may vote by their plenipotentiaries, either individually or collectively, in the following manner:—

| | Votes. |
|---|---|
| 1. Austria | 4 |
| 2. Prussia | 4 |
| 3. Bavaria | 4 |
| 4. Saxony | 4 |
| 5. Hanover | 4 |
| 6. Wirtemburg | 4 |
| 7. Baden | 3 |
| 8. Electoral Hesse, or Hesse Cassel | 3 |
| 9. Grand Duchy of Hesse, (Hesse Darmstadt) | 3 |
| 10. Denmark, for Holstein | 3 |
| 11. Netherlands, for Luxemburg | 3 |
| 12. Brunswick, 2; Nassau, 2 | 4 |
| 13. Mecklenburgh Schwerin, 2; Strelitz, 1 | 3 |
| 14. Saxe Wiemar, Gotha, Coburg, Meinungen, and Hildburghausen, each 1. | 5 |
| 15. Holstein Oldenburgh, 1; Anhalt Dessau, 1; Anhalt Bernburg, 1; Anhalt Kotthen, or Cothen, 1; Schwartzburg Sonderhausen, 1; Schwartzburg Rudolstadt, 1 | 6 |
| 16. Hohenzollern Hechingen, 1; Lichtenstein, 1; Hohenzollern Sigmaringen, 1; Waldeck, 1; Elder Reuss, 1; Younger Reuss, 1; Schaumburg-Lippe, 1; Lippe, 1; and the four free cities of Frankfort, Bremen, Hamburg, and Lubeck, each a vote | 12 |
| Total | 69 |

Austria presides at the federative diet.

The chief towns of Germany, independently of those in kingdoms, are Hamburg, on the Elbe, one of the first commercial cities in Europe; Frankfort, Mentz, Manheim, Heidelberg, Cassel, Bremen, Gotha, &c. The principal rivers are, the Danube, the largest in Europe; the Rhine, running from Switzerland to Holland; the Elbe, running through Prussia and Saxony; the Maine, the Weser, and the Oder.

Saxony.—The electorate of Saxony was raised into a kingdom by Napoleon, but after his defeat in 1814 was stripped of several of its territories. It now contains 1,400,000 people, esteemed the happiest and most industrious in Germany. Dresden is the capital, and Leipsic, one of the most flourishing towns, is a

university. In relation to the trade of Saxony the exports consist in wool, minerals, linen, yarn, woollens, and lace. The importss are, silk, flax, cotton, coffee, sugar, wine, and sometime corn.

Bavaria, kingdom of, is the third state in the German Confederation. It is divided into the following eight circles: Isar, Upper Maine, Lower Maine, Rezat, Regen, Upper Danube, Lower Danube, and Rhine, the last of which is situated on the left bank of the Rhine. Each circle is subdivided into a certain number of courts of justice. The capital is Munich (Munchen), and the Bavarian dominions, bounded by the Austrian states, Wirtemburg, and Saxony, contain about 4,000,000 inhabitants. This kingdom includes the cities of Ratisbon, (Regensburg,) Augsburg, Wurzburg, &c. Volcanic rocks are found here, together with granite, gneiss, sienite, and porphyry, supporting sandstone, argillaceous and calcareous rocks, besides copper, cobalt, and iron. Agriculture is much encouraged by the Bavarian government, and varieties of grain are cultivated here, many kinds of fruit, and much wine produced.

Wirtemburg.—This kingdom of Germany forms part of the old circle of Suabia, having Bavaria on the east, and Baden on the west. Its territorial division is into the four circles of Jaxt, Neckar, Black Forest, and Danube. These are further divided into twelve small counties, each of which is subdivided into bailiwics. The population is 1,536,000. It produces plenty of pasture, corn, fruit, and a great deal of Neckar wine. There are also mines and salt springs, and much game. The manufactures are linen, woollen, and iron-works. This country was erected into a kingdom by Napoleon in 1805, who made great additions to it by the territories taken from Austria. Stutgard is the capital.

Hanover.—This kingdom and member of the Germanic Confederacy, formerly a dependency on the British crown, is bounded on the north-west by the German Ocean, on the north-east by the river Elbe, on the south-west by Dutch Friesland and Prussian Westphalia, and on the south-east by Saxony. It consists of the duchy of Bremen, the principality of Luneburg, and several other countries, some of which are detached from the main body. The population amounts to 1,600,000, of whom 1,300,000 are Lutherans. With the exception of the chain of mountains called the Hartz, and some other elevated tracts in the south, this territory consists of an immense plain, with gentle undulations, but hardly any that can be called a mountain. In the south the valleys are

fertile; in the north are many barren heaths and moors. Iron, copper, and lead, are wrought here to a great extent. The iron mines are the most productive, and their annual tenth paid to the crown yields a revenue of about 115,000*l*. Agriculture in general is in a backward state. Thread and linen manufactures are carried on in various parts. The other manufactures are coarse woollens, paper, leather, and glass. The only town which has a maritime trade of consequence is Embden. The goods imported include English manufactures and colonial produce; linen from Friesland and Prussia; broad cloth, silk, and jewellery from France. The chief exports are coarse linen, iron, and copper from Hartz, timber cut in planks, also horses and black cattle from various parts of the kingdom. Hanover has one university at Gottingen. George IV. of England, when prince regent, gave Hanover a modified charter, under which the chambers exercised the same privileges as the former provincial deputies. By the law of Hanover the crown devolved in the male line; at the death of William IV. of England, therefore, that monarch was succeeded by Ernest Augustus, duke of Cumberland, his eldest surviving brother, who was proclaimed king of Hanover on the 24th of June, 1837. One of the first acts of his reign was to make unpopular changes in the existing constitution. This gave great disquietude to some of the legislatures of the minor states in Germany, who were conscious on how frail a foundation their own representative privileges were erected. The states of Baden voted that the abrogation of the Hanoverian constitution was in violation of the feudal act of the Germanic league, and their example was followed by Bavaria and Saxony.

Smaller Principalities and States.—Germany contains many minor states of some importance. Among these the chief are, Baden, on the borders of Switzerland, including, besides Carlsruhe the capital, the beautiful city of Manheim. Population 1,100,000. Hesse-Cassel, a flourishing territory in the north, with a population of 700,000, has Cassel for its capital. Darmstadt, a territory on the Rhine, including the fine ancient city of Mentz, or Mayence. Brunswick, from whose house the British royal family is descended. Weimar, noted for the patronage of men of genius, and considered the literary capital of Germany. Mecklenburg-Schwerin, and Mecklenburg-Strelitz, the last of which, though small, has given two queens to England. Oldenburg also deserves notice. There are besides a great number of very small principalities, which will be found enumerated in the list of the German Confederation.

Austria,—The dominions of the emperor of Austria, formerly called emperor of Germany, is, next to Russia, the largest in extent in Europe, and contains besides Austria Proper, part of Germany, Hungary, part of Poland, Venice, and Lombardy: total about 32,000,000 inhabitants. By the partition of Poland, Austria acquired one-sixth part, and 4,000,000 of subjects. Her power was much crippled in the wars which she waged against Napoleon, but she has now recovered more than she lost. With the exception of Russia, no European nation comprises such a diversity of tribes, or distinct races of mankind: the most numerous of these races is Sclavonian. The air is in general healthy; and the product of the vine is a source of considerable wealth to Austria. The capital of this empire is Vienna. The other chief towns are Prague, Presburg, Venice, and Milan. The principal mountains are, the Tyrolese, the Alps, and the Carpathian; and the rivers are the Danube, the Moldau, and the Drave.

This great empire consists of the following kingdoms and provinces, with the annexed population.

| | |
|---|---|
| Hungary | 7,400,000 |
| Moravia, Austrian Silesia | 1,968,713 |
| Galicia | 4,850,000 |
| Austria Proper, and Upper and Lower | 2,008,978 |
| Saltzburgh and Berchtolsgaden | 200,000 |
| Styria | 829,731 |
| Carinthia | 280,000 |
| Carniola | 420,000 |
| Friuli and Trieste | 106,000 |
| Bukowine | 250,000 |
| Bohemia | 3,698,596 |
| Transylvania | 1,600,000 |
| Sclavonia | 500,000 |
| Croatia | 350,000 |
| Lombardy, &c. | 2,000,000 |
| Istria | 100,000 |
| Venetian States | 1,650,000 |
| Dalmatia | 300,000 |
| Tyrol | 762,053 |
| Total population | 29,274,071 |

Holland and Belgium.—These maritime countries have undergone very considerable changes. The former was once a flourishing republic, and consisted of Seven United Provinces,

forming a part of the seventeen, originally denominated the Netherlands, or Low Countries. The remaining ten, having been for many years subject, first to Spain, and then to Austria, after the convulsions consequent on the French revolution, were, in 1814, united with Holland, under a prince of the house of Orange Nassau, and formed into the kingdom of the Netherlands. But during the last few years, other revolutionary movements have taken place, in which the ten provinces have revolted from their allegiance to the king of the Netherlands, and chosen Leopold, Prince of Saxe-Coburg, as their sovereign. This arrangement, after many convulsions, appears, at length, to have assumed a permanent character, and the geography of the Netherlands may be considered as settled.

The inhabitants of the United Provinces, called *Holland*, are a very hardy race, and make excellent mariners. The country exhibits a flat surface of fields and meadows, intersected by rivers and canals, which are as numerous as roads in other countries, with immense banks or dykes, which protect it from the encroachments of the sea. Holland is divided into the provinces of North and South Holland, Zealand, Utrecht, Guelderland, Overyssel, Doenthe, Groningen, Friesland, and North Brabant. The principal cities are Amsterdam, Rotterdam, Leyden, Haarlem, and that large and beautiful village, the Hague. The towns have commonly canals of communication, not only between the principal streets of each, but between each other.

*Belgium* consists of South Brabant, East and West Flanders, Hainault, Namur, Liege, and part of Limburg and Luxemburg. The principal cities are, Brussels, Antwerp, Bruges, Ghent, Maestricht, Namur, Flushing, &c. The population is about 4,000,000. The foreign trade is almost wholly conducted through the port of Antwerp, and consists of woollen cloths, &c.

France.—This extensive country occupies a commanding situation in the centre of Europe, and has always been distinguished by the military prowess of its armies, the intriguing spririt of its government, and the volatile character of its inhabitants. It is bounded on the north by the British Channel and Holland; on the east by the Rhine, Switzerland, and the Alps; on the south by the Mediterranean Sea and the Pyrenees; and on the west by the Atlantic Ocean; and contains upwards of 32,900,000 inhabitants. The climate of France is the most agreeable in Europe; the air is generally temperate, and removed from the extremes of heat and cold, and the soil is excellent. Except in some mountainous tracts, which are chiefly on the

frontiers, the face of the country is in general flat and well watered by many fine rivers. Its chief productions are corn, fruit, oil, wine, and most of the luxuries of life. The wines of Champagne, Burgundy, and Bordeaux, are well known. Much brandy is likewise made here. The government of this country is at present a limited monarchy; in its principle, perhaps, more nearly approximating to that of Great Britain than any other country in the world. Owing, however, to the frequent changes which have taken place during the last fifty years, in which its political institutions have sustained almost every possible variation, from despotism to anarchy, they cannot be considered as by any means permanent. France was anciently divided into provinces; but since the revolution in 1789, it has been divided into eighty-six departments. Besides Paris, the capital, which in magnitude and population is only inferior to London, the principal towns are, Lisle, or Lille, Amiens, Rouen, Rheims, Verdun, Nancy, Strasburg, on the north; Besançon, Lyons, Grenoble, Montauban, on the east; Aix, Avignon, Montpelier, Toulouse, to the south; Rennes, Poitiers, to the west. Its sea-ports in the north and west are Dunkirk, Calais, Boulogne, Dieppe, Havre, Cherbourg, St. Malo, Morlaix, Brest, L'Orient, Nantes, Rochelle, Rochefort, Bordeaux; and in the Mediterranean, Marseilles and Toulon. The principal mountains are the Alps, which divide it from Italy; and the Pyrenees, which divide it from Spain. The rivers are, the Rhone, the Garonne, the Loire, the Seine, and the Somme. The Rhine is a boundary between France and Germany only on the eastern side near Switzerland. The French are lively in conversation, polished, gallant, and brave, but light, inconstant, and vain. They pay great attention to the arts and sciences, yet in general their knowledge is less profound than brilliant. Public instruction is promoted by an university, besides which there is a royal college, and many academies.

At the close of the eighteenth century a memorable revolution took place in France, which brought on a long and protracted war throughout Europe. In 1792, the destruction of the monarchy occurred; this desperate event was succeeded first by a republican government, from 1792 to 1794; by a national convention from 1794 to 1799; by an executive directory, consisting of five members, from 1799 to 1804; and by consuls. Napoleon ruled as emperor from 1804 to 1814. Napoleon again ascended the throne and ruled for 100 days, in 1815; after which Louis XVIII. was restored, and died in 1824. To him succeeded Charles X. who was driven from the throne on the 30th of July 1830; and Louis Philip, of the Orleans branch, descended from a brother of Louis

XIV., was raised to the throne, with the style and title of King of the French.

Switzerland is situated in the Alpine regions, between Germany, Italy, and France, and consists of twenty-two cantons, among which the chief are Zurich, Berne, and Geneva. In this country the Rhine and the Rhone take their rise, flowing in almost opposite directions; while the lakes of Constance and Geneva are not only among the largest, but the most beautiful in Europe. The Swiss are an honest, simple race, fondly attached to liberty and their country, robust in their persons, and courageous in their hearts. The principal towns are, Berne, Basle, Zurich, Lucern, Zug, Constance, Geneva, and Lausanne; the last two celebrated for the beauty of their situation. The mountains are very numerous. The Alps divide Switzerland from Italy, and Mount Blanc, the highest in Europe, is on its immediate border. From these mountains masses of ice, called glaciers, descend and overwhelm houses, and even villages.

Italy is an ancient peninsula in the south of Europe, at that time the seat of power and civilization. Though much decayed it is still a very fine country, blessed in general with a genial and not intemperately hot climate, and a rich soil; producing corn, wine, and oil, in abundance, with a variety of the choicest fruits: it may be styled the garden of Europe, and the parent of its arts and civilization. The Italians are a polished, spirited people; great politicians, but dissumulators, vindictive, and jealous; they possess much taste for the fine arts, principally painting, music, and poetry. But education is rare among the common people. The chief mountains, exclusive of the Alps, which form its boundary on the side of Switzerland, are the Appennines, which run through its whole extent; and the volcanic mountains, Vesuvius and Ætna. Its principal rivers are, the Po, the Arno, the Tiber, the Var, and the Adige. The following are the present divisions of Italy since the political changes which have taken place in Europe. 1. The states of the church, or dominions of the pope; comprehending Bologna, Ferrara, Romagna, Ancona, Perugia, Urbino, Ombria, and St. Peter's Patrimony. 2. The kingdom of the Two Sicilies; that is, Naples, comprehending the Terra di Lavoro, the Abbruzzos, Apulia, and Calabria, and the island of Sicily, with several small isles adjacent. 3. The grand duchy of Tuscany, governed by an Austrian archduke. 4. The kingdom of Sardinia; comprehending Piedmont, Savoy, the duchy of Genoa, and the isle of Sardinia. 5. The kingdom of

Lombardy and Venice, belonging to Austria; comprehending the Milanese, the duchy of Mantua, the Valteline, and the territory of Venice, now called the Lombardy Venetian kingdom. 6. The duchies of Parma and Placentia, governed by the Empress Maria Louisa, widow of Napoleon.

Italy contains also the small duchies of Modena and Lucca, and the very small republic of San Marino.—Rome, the chief city of Italy, in latitude 41° 54′ north, was once the capital of the civilized world, but is sinking fast into decay. Its population under Augustus was 2,000,000, and its circumference fifty miles, but under the pope its population does not exceed 100,000. Florence, the capital of Tuscany, has long been regarded as the Athens of modern Italy; Milan is the capital of Lombardy; Turin of Sardinia; Venice, Mantua, Parma, and Genoa, are also fine cities. The kingdom of Naples occupies the south of Italy, and contains about 6,000,000 inhabitants. Naples, its capital, is one of the largest cities in Europe, and contains about 350,000 inhabitants. Sicily, the finest island in Europe, is separated from Calabria by the straits of Messina, famous for the Scylla and Charybdis of the ancients, the former a rock, the latter a whirlpool. The chief towns are Palermo, Messina, and Syracuse. Sardinia, a large but poor island, is situated in the centre of the Mediterranean: the principal town is Cagliari. Corsica, belonging to France, is mountainous, and its chief town is Bastia. The small but important island of Malta lies about sixty miles south of Sicily, and is celebrated for its fine port, and for the strength of its fortifications. It now belongs to Great Britain. Elba, an island of Tuscany, is famous as the chosen retreat of the Emperor Napoleon, when he abdicated the throne of France in 1814.

Portugal, the most westerly kingdom of Europe, lies between Spain and the Atlantic Ocean. It is divided into six provinces. The chief rivers are the Tagus and the Douro. The principal towns are Lisbon, the capital, and Oporto. The soil of Portugal produces wheat, barley, hemp, and other productions of northern climates. The best fruits are, olives, oranges, and lemons. Silk is made of a good quality. But the country is very backward in manufactures. Portugal has lost the extensive dominions she once possessed in South America, Asia, and Africa; the chief of these, the territory of Brazil in South America, is now formed into an independent state. The Portuguese, like their neighbours the Spaniards, are, in their national character, much degraded by bigotry and superstition. The government has undergone many changes since the French revolution. After the expulsion of the

French and the general pacification of Europe (1814) the king, who had taken refuge in Brazil, returned, but this country continued to be the scene of internal discord, chiefly through the machinations of Don Miguel, the youngest son of John VI. who, after the death of his father, in 1826, assumed the reins of government, which he exercised in the most cruel and despotic manner for several years. At length he was compelled to leave the country by the troops of his brother, Don Pedro, late emperor of Brazil, who before his death, succeeded in placing his daughter, the infanta Donna Maria, on the throne of Portugal.

Spain is a country in the south-west of Europe. Though much intersected with mountains (which abound in minerals, metals, and precious stones) it is remarkable for its fine climate and soil. The valleys produce corn, wine, and fruits; while the more mountainous tracts support vast flocks of sheep, of the Merino breed, whose wool is so necessary in the manufacture of fine broad cloths. The foreign trade of Spain comprises a variety of articles, both of export and import: the principal of which are wine, brandy, fruit, olive, cottons, corn, and naval stores. In summer the climate is hot and sultry, especially in the central provinces. Spain is divided into fourteen districts or provinces, containing about 12,000,000 inhabitants. Granada and Murcia on the south are the most fertile tracts in Europe; but Spain has latterly, from bad government, and want of spirit and industry in the inhabitants, become, comparatively, a poor country. The chief towns are Madrid, the capital; Barcelona, Seville, Granada, Malaga, Saragossa, Alicant, Toledo, Salamanca, and Cadiz. The principal rivers are, the Ebro, the Tagus, and the Douro. The chief mountains are the Pyrenees, which separate Spain from France. On a promontory, in the south of Spain, stands Gibraltar, which has been in the possession of the English since 1704, and is so defended by nature and art, as to be considered impregnable. The chief islands lying near Spain are, Majorca, Minorca, and Ivica, called the Balearic Isles, and deservedly celebrated for their fertility and fine climate. The government, like that of Portugal, has undergone many changes. The compulsory abdication of the royal family of Spain by Buonaparte, which took place in 1808, was followed by a general insurrection, the well-known peninsular war, and the evacuation of the Spanish territory by the French in 1813, when Ferdinand VII. was restored. The first acts of Ferdinand were to revive the inquisition, and other abuses, and banish and imprison those men who, to the best of their power, had contributed to his re-establishment. The dissatis-

faction which his conduct produced, together with the contrariety existing in the political views of the great body of the people, have rendered Spain for some years a scene of civil commotion. The country is divided into two opposing factions, which have threatened the extinction of all social order. The recent death of the Spanish monarch, and the accession of the present queen, however, hold out the expectation of the speedy amelioration of these evils.

Turkey in Europe.—This country, on which nature has lavished a variety of blessings, at one time ranked high in the scale of nations, but owing to the despotism and misconduct of its government, it has lost some of its finest possessions, including the kingdom of Greece, now separated from it, and its power and influence are rapidly on the decline. The climate is fine, though rather hot; and the soil is naturally abundantly productive; but under the indolent, enslaved, and sensual Turks, agriculture is neglected, and the very air is contaminated by filth, so as to give rise to frequent visitations of the plague. The government is despotic, under the Grand Seignior, who is master of the lives and property of his subjects. The provinces are governed by Pashas, many of whom are nearly independent of their imperial master. The principal provinces are, Bulgaria, Rumelia, which includes Macedonia and Thessaly, and the extensive territories which constitute Albania. The principalities of Moldavia, Wallachia, Bosnia, and Servia, along the Danube, are governed by princes appointed by the Porte, to whom they pay tribute. The metropolis of Turkey is Constantinople, finely situated in 41° north latitude, between the sea of Marmora and the Black Sea, and one of the most considerable cities in the world. Adrianople is the second city in European Turkey. Salonica has a great trade; Schumla, Silistria, Nicopolis, and Belgrade, are strong frontier fortresses. Wheat, maize, rice, cotton, silk, and tobacco, are all natural to this country; they are raised in it at present, but the extent of their culture might be carried much further. The chief river in European Turkey is the Danube. The chief mountains are Hænus, or the Balkan, a long lofty range, which forms a barrier against Russia; Pindus and Olympus, in Thessaly; Mount Athos, celebrated in classic history, is now inhabited by thousands of monks and hermits. The Turkish islands were very numerous; but most of them are annexed to the new state of Greece, and the only important one which she retains is Candia, a fertile island, anciently celebrated and powerful under the name of Crete. The population of Turkey in Europe is estimated at 10,000,000. The Turks are idle and ignorant; devoted to their religion, which is Mahometan,

and the rule of their faith, the Koran; but inclined to hospitality, when the more malignant passions of jealousy and revenge are not excited. The lower class are almost devoid of education, and in the arts they are equally backward.

The possessions of the Turks were formerly very considerable. They were originally a Tartar tribe, who having subdued their neighbouring states their dominions were united under Othman, or Osman, who assumed the title of Sultan, and established his empire at Prusa, in Bithynia, about the year 1300. His successors extended their conquests over the adjacent parts of Asia, Africa, and Europe. Adrianople was taken by them as early as A.D. 1360. In 1453 Constantinople was taken from the Greeks, and became the capital of the Turkish empire. After the battle of Pultava, and the retreat of Charles XII. of Sweden into Turkey, in 1704, the czar, Peter the Great, advanced against the Turkish frontier: he was, however, obliged to sign the treaty of Pruth, which stipulated the surrender of Azoph and some other fortresses. Since that time the Turks have experienced many reverses, and recent events, particularly the loss of Greece, and the cession of large tracts of territory to Russia, have shown the instability of their power in Europe. The late Sultan Mahmoud formed plans for the civilization and improvement of his subjects, but his recent death has left it doubtful how far these attempts will be ultimately successful.

Greece, the most celebrated country of the ancient world, has for many ages been in an oppressed and miserable state. Recently, however, the Greeks made a brave stand for their independence; and being supported by the great Christian powers, they have compelled Turkey to withdraw her claims. Since the establishment of its present constitutional kingdom, amidst many difficulties and obstacles to its improvement, it has made considerable advances, and commerce is pursued with great activity. Learning, where it once flourished with such unrivalled splendour, had fallen into a state of total extinction. With wealth and the spirit of independence, however, has arisen a strong desire to revive the ancient glory of their country, and some progress has been made. The new state of Greece comprehends the Morea (the ancient Peloponnesus), with the territory of the ancient Attica and Thebes, as far south as the gulfs of Arta and Volo. It includes also the islands of Negropont, Hydra, and the Cyclades. The population is not supposed to exceed 700,000; but it is expected to increase under a free government. Otho, prince of Bavaria,

has been chosen king. Athens, recently chosen as the capital, is still a considerable town, adorned with the most splendid ruins. Thebes, Corinth, and Sparta, are now only villages. The chief modern towns are, Tripolizza, Napoli di Romania, Patras, and Missolonghi.

On the south-west of Greece lies the confederacy of the Seven Islands, consisting of Corfu, Leucadia, Cephalonia, Ithaca, Zante, Cerigo, and others, having an independent government, but under the military protection of Great Britain.

## GREAT BRITAIN AND IRELAND.

This United Kingdom, consisting of the two large islands of Great Britain and Ireland, besides various small islands, is situated to the west of the continent; it is divided into England, Scotland, and Wales, formerly each a kingdom of itself. England and Scotland were united in the year 1707, when the whole island was called Great Britain; Ireland was not united with this country till the commencement of the present century. Great Britain is about 600 miles long, and 300 broad; and at the census of 1831, appeared to contain 13,394,574 inhabitants. The fine and admirable constitution enjoyed by Great Britain, the intelligence, industry, and enterprise of her people, have raised her to the highest pitch of greatness: her maritime power, her manufacturing industry, and her commerce with every quarter of the globe, are completely unrivalled.

## ENGLAND.

England is divided into forty counties, or shires, and these counties are classed into six circuits for the administration of justice. The counties thus classed, with their county or assize towns, are as under:

*Northern Circuit.*

| *Counties.* | *Chief Towns.* |
|---|---|
| Northumberland | Newcastle |
| Durham | Durham |
| Cumberland | Carlisle |
| Westmoreland | Appleby and Kendal |
| Yorkshire | York |
| Lancashire | Lancaster |

*Midland Circuit.*

| | |
|---|---|
| Warwickshire | Warwick |
| Leicestershire | Leicester |
| Derbyshire | Derby |

| *Counties.* | *Chief Towns.* |
|---|---|
| Nottinghamshire | Nottingham |
| Lincolnshire | Lincoln |
| Rutland | Oakham |
| Northamptonshire | Northampton |
| *Oxford Circuit.* | |
| Oxfordshire | Oxford |
| Buckinghamshire | Buckingham |
| Gloucestershire | Gloucester |
| Worcestershire | Worcester |
| Monmouthshire | Monmouth |
| Herefordshire | Hereford |
| Shropshire | Shrewsbury |
| Staffordshire | Stafford |
| *Norfolk Circuit.* | |
| Bedfordshire | Bedford |
| Berkshire | Reading & Abingdon |
| Huntingdonshire | Huntingdon |
| Cambridgeshire | Cambridge |
| Suffolk | Ipswich |
| Norfolk | Norwich |
| *Home Circuit.* | |
| Essex | Chelmsford & Colchester |
| Hertfordshire | Hertford |
| Kent | Maidstone |
| Surrey | Guildford |
| Sussex | Chichester |
| *Western Circuit.* | |
| Hampshire | Winchester |
| Wiltshire | Salisbury |
| Dorsetshire | Dorchester |
| Somerset | Wells |
| Devon | Exeter |
| Cornwall | Launceston, Bodmin |

Middlesex and Cheshire have distinct courts of their own, and are called Counties Palatine. The counties of Durham and Lancashire are also Palatine.

London, the metropolis of Great Britain, is in 51½° north latitude, and contains 1,400,000 inhabitants. It is the largest city, and the greatest seat of commerce, in the world.

The other principal towns in England are, Birmingham, Sheffield, Dudley, and Wolverhampton, famous for iron and steel

goods; Manchester, Preston, Bolton, and Blackburn, for cotton works; Leeds, Wakefield, Halifax, and Exeter, for woollen cloth; Norwich and Coventry, for silks; Nottingham, Leicester, and Mansfield, for stockings; Wilton and Kidderminster, for carpets; Bridport and Plymouth, for coarse flax and hempen goods.

Staffordshire and Leicestershire are famous for earthenware and china; Buckinghamshire and Bedfordshire for lace; Suffolk and Somersetshire for linen cloth. Tin is produced from Cornwall; lead and copper from the south-western counties, and from Derbyshire and Yorkshire; iron and coals from the northern counties, and from Wales.

The dock yards for the navy are, Portsmouth, Plymouth, Chatham, Sheerness, Woolwich, Deptford, and Milford. The trading ports are London, Liverpool, Bristol, Hull, Yarmouth, Falmouth, Sunderland, Lynn, Swansea, and Whitehaven.

There are two archbishoprics, Canterbury and York; and twenty-four bishops, including two Welsh bishoprics. The universities are Oxford and Cambridge.

The principal rivers in England are, the Severn, the Thames, the Humber, the Mersey, the Trent, and the Medway.

The Isle of Wight on the southern coast is famous for its picturesque beauty; Jersey, Guernsey, Alderney, and Sark, are populous small islands near the coast of France. The Isle of Man is in the Irish Sea. The numerous Scilly Islands stretch beyond the promontory of Cornwall. On the coast of Northumberland lie the Holly, Fern, and Coquet Islands; and in Kent are Thanet and Sheppey.

The chief mountains and hills in England are, the Cheviot, between England and Scotland; Pendle, in Lancashire; Fells, in Cumberland and Yorkshire; Malvern, in Worcestershire; Mendip, in Somersetshire; the Peak, in Derbyshire; and the Wrekin, in Shropshire.

## WALES.

Wales, inhabited chiefly by the descendents of the ancient Britons, most of whom still speak the Welsh language, is divided into twelve counties, six north, and six south.

The Northern Counties are:—

| *Counties.* | *Chief Towns* |
|---|---|
| Flintshire . . . . . | Flint |
| Denbighshire . . . . . | Denbigh |

| *Counties.* | *Chief Towns.* |
|---|---|
| Caernarvonshire | Caernarvon |
| Anglesea | Beaumaris |
| Merionethshire | Harlech |
| Montgomeryshire | Mongtomery |

The Southern Counties are :—

| | |
|---|---|
| Cardiganshire | Cardigan |
| Radnorshire | Radnor |
| Pembrokeshire | Pembroke |
| Caermarthenshire | Caermarthen |
| Brecknockshire | Brecknock |
| Glamorganshire | Cardiff |

The island of Anglesea forms one of the counties of Wales; and from Holyhead, on the western side of this island, is the common passage to Dublin. The population, in 1831, amounted to 805,236.

The Welsh are generally frugal, hospitable, and brave; somewhat irritable in their temper, and attached to conviviality.

## SCOTLAND.

Scotland, the northern division of Great Britain, is inhabited by a brave, industrious, thrifty, and temperate, race of people, amounting, in 1831, to 2,367,807. It is divided into thirty-three counties, as under:

The Northern Counties are ten :—

| *Counties.* | *Chief Towns.* |
|---|---|
| Orkney | Kirkwall |
| Caithness | Wick |
| Sutherland | Strathy, Darnock |
| Ross | Ross, Taine |
| Cromarty | Cromarty |
| Nairn | Nairn |
| Moray, or Elgin | Elgin |
| Bamff | Bamff |
| Aberdeen | Aberdeen |
| Inverness | Inverness |

The Middle Counties are nine :—

| | |
|---|---|
| Perth | Perth |
| Angus | Forfar, Montrose |

| *Counties.* | *Chief Towns.* |
|---|---|
| Mearns, or Kincardine . . . | Bervie |
| Argyle . . . . . | Inverary |
| Dumbarton . . . . . | Dumbarton |
| Stirling . . . . . | Stirling |
| Clackmannan . . . . . | Clackmannan |
| Kinross . . . . . | Kinross |
| Fife . . . . . | St. Andrew's |

The Southern Counties are fourteen :—

| | |
|---|---|
| Bute . . . . . | Rothsay |
| Renfrew . . . . . | Renfrew, Greenock |
| Lanark . . . . . | Glasgow, Lanark |
| Linlithgow . . . . . | Linlithgow |
| Edinburgh . . . . . | Edinburgh |
| Haddington . . . . . | Haddington, Dunbar |
| Peebles . . . . . | Peebles |
| Berwick . . . . . | Dunse, Berwick |
| Ayr . . . . . | Ayr |
| Wigton . . . . . | Wigton |
| Kircudbright . . . . . | Kircudbright |
| Dumfries . . . . . | Dumfries |
| Selkirk . . . . . | Selkirk |
| Roxburgh . . . . . | Roxburgh |

Edinburgh, Glasgow, Aberdeen, and St. Andrews, are the celebrated seats of learning : Glasgow is no less distinguished for its extensive manufactures and commerce.

The islands adjoining to Scotland are the Shetland, the Orkney, the Hebrides (Hebudes,) or Western Islands, and those of Arran and Bute, which form one of the counties.

The most considerable lakes are Loch Tay ; Loch Lomond, which contains several islands ; Loch Awe, and Loch Ness. The highest mountains are Ben Lomond and Ben Nevis.

The climate of Scotland is cold, but salubrious ; in many places, particularly in the Highlands, there are lofty mountains covered with heath ; in the Lowlands and the southern district are many rich and cultivated tracts. It produces corn, cattle, and sheep ; has some valuable mines of lead, iron, and coal ; and many important manufactures are established in different parts, which increase its wealth, and the comforts of the inhabitants. The Scotch are intelligent, frugal, and industrious ; brave in war, and capable of undergoing the greatest fatigues.

## IRELAND

Ireland is divided into four large provinces; viz. Ulster northward, Leinster eastward, Munster southward, and Connaught westward. The population, in 1831, amounted to 7,734,365.

The province of Leinster contains twelve counties:—

| *Counties.* | *Chief Towns.* |
|---|---|
| Dublin | Dublin |
| Louth | Drogheda |
| Wicklow | Wicklow |
| Wexford | Wexford |
| Longford | Longford |
| East Meath | Trim |
| West Meath | Mullingar |
| King's County | Philipstown |
| Queen's County | Maryborough |
| Kilkenny | Kilkenny |
| Kildare | Naas and Athy |
| Carlow | Carlow |

The province of Ulster contains nine counties:—

| | |
|---|---|
| Down | Downpatrick |
| Armagh | Armagh |
| Monaghan | Monaghan |
| Cavan | Cavan |
| Antrim | Carrickfergus |
| Londonderry | Derry |
| Tyrone | Omagh |
| Fermanagh | Enniskillen |
| Donegal | Lifford |

The province of Connaught contains five counties:—

| | |
|---|---|
| Leitrim | Leitrim |
| Roscommon | Roscommon |
| Mayo | Newport |
| Sligo | Sligo |
| Galway | Galway |

The province of Munster contains six counties:—

| | |
|---|---|
| Clare | Ennis |
| Cork | Cork |

| *Counties.* | *Chief Towns.* |
|---|---|
| Kerry . . . . . | Tralee |
| Limerick . . . . . | Limerick |
| Tipperary . . . . . | Clonmell |
| Waterford . . . . . | Waterford |

Of the population of Ireland, a very small proportion are of the established church, the larger proportion being catholics and dissenters. Dublin is the capital, and contains its only university. Cork, Londonderry, Limerick, Waterford, and Belfast, are famous as ports and places of trade. The principal rivers are, the Shannon, the Blackwater, the Boyle, and the Liffey. The principal lake is Killarney, the most beautiful in the British dominions. The climate is very moist, but not unwholesome; the soil in most places is rich, and if properly cultivated would yield a very large increase. The Irish are polite, hospitable, and brave, but hasty in their disposition. Many political and religious disabilities have, for centuries, repressed their native energies; but some of these have been relieved, and it is hoped others will also be removed, so as to facilitate the progress of education and general improvement.

## Asia.

Asia is one of the principal, and, in some respects, the most interesting quarter of the globe. It was the nursery of the human race in the earliest ages; the seat of the great empires of Babylon, Assyria, and Persia; and the scene of our Saviour's labours on earth. The Christian religion, though first promulgated in Asia, had been long banished from it; but through the labours of the missionaries it has gained many adherents throughout all Asia by means of translations of the Bible. Even in China, Christians are to be found; and in short everywhere except in Japan, where they have been entirely banished since the year 1637. The Asiatics are chiefly Mahometans, or pagans, and, among the latter, idolatry puts on a different form in almost every district. In Thibet, the Grand Lama is worshipped; in China, the deism of Confucius prevails; and in India, Bramah is the object of worship, in connexion with many superstitions.

Asia is bounded on the north by the Frozen Ocean; on the east by the Pacific Ocean; on the south by the Indian Ocean; and on the west by the Red Sea, the Mediterranean, and Europe; extending about 7,200 miles from east to west, and 5,700 from north to south, and containing 450,000,000 inhabitants.

Asia may be considered as the richest and most fruitful part of the world. It abounds in corn, wine, and fruits, of all sorts It furnishes every thing necessary for life, health, and enjoyment; and supplies the other parts of the world with spices, drugs, diamonds, precious stones, silks, muslins, coffee, tea, &c. &c. The Asiatics are in general effeminate, luxurious, indolent, and servile, but they evince considerable genius in various arts and sciences.

The principal governments of Asia are those of Russia, Turkey, China, Persia, Hindostan, or India, and Japan. In this quarter of the globe the boundaries of states are continually changing, owing to the frequent wars and other causes. The following is a summary of the most considerable nations :—

| | *Nations.* | *Chief Towns.* |
|---|---|---|
| | Russian Tartary, Siberia, &c. | Astrachan and Tobolsk |
| | Circassia and Georgia (annexed to Russia) | Tefflis |
| | Independent Tartary | Samarcand |
| | Chinese Tartary | Cashgar |
| | Thibet, or Tibet | Lassa |
| *In the Turkish Empire.* | Natolia, or Asia Minor | Smyrna, Bursa |
| | Armenia | Erzerum |
| | Diarbekir and Algesira | Diarbekir, Mosul |
| | Kurdistan | Bitlis, Altun-kupri |
| | Irak-Arabi | Bassora, Bagdad |
| | Syria | Aleppo, Damascus |
| | Palestine, or the Holy Land | Jerusalem |
| | Arabia. | Sana, Medina, Mecca |
| | Persia | Teheran, Ispahan |
| | Cabul | Cabul, Candahar |
| | Hindostan (native powers) | Hydrabad, Gwalior |
| | British India | Calcutta, Benares, Surat, Madras, Bombay |
| | Birman Empire | Ava, Pegu, Rangoon |
| | Siam | Bankok |
| | Cochin-China and Tonquin | Hue-foo, Kesho, and Saigon |
| | Chinese Empire | Pekin, Nankin, and Canton |
| | Japanese Empire | Jeddo and Meaco |
| | Eastern Archipelago | Batavia |

The greatest part of Asia lies within the torrid and temperate zones ; the degree of heat in general is therefore very considerable ; and the soil, aided by the powerful rays of the sun, is capable of producing the richest fruits, and that in great abundance.

The islands belonging to Asia are the Eastern Archipelago,

containing the islands of Java, Sumatra, Borneo, Celebes, the Philippines, and the Spice or Molucca islands; the Aleutian, the Kuriles, the isles of Japan, Formosa, Ceylon, the Maldives, &c.

The oceans and seas adjoining Asia are the Northern, Pacific, and Indian Oceans; the Black, Red, Arabian, Chinese, and Yellow Seas; the seas of Kamtschatka, Okhotsk, and Corea; the gulfs of Persia, Siam, and Tonquin; the bay of Bengal, the Levant, and the Archipelago. The Caspian Sea, bounded on the south by Persia, is properly an immense lake, having no connexion with any other portion of water: so is the Aral, to the east of it.

The principal straits of Asia are, Behring's, which separate it from America; the Straits of Malacca; of Sunda, between Java and Sumatra; of Ormus, between Persia and Arabia; and of Babelmandeb, which separates Arabia from Africa.

The chief rivers of Arabia are, the Kiang Ku, the Hoang Ho, the Lena, the Yenisei, the Obi, the Amoor, the Burrampooter, the Ganges, the Tigris, the Euphrates, and the Indus.

The principal Asiatic mountains are, the Himalaya, north of Bengal, 28,000 feet high, and the highest in the world; the Uralian, the Altaian, the Sayausk, the Alak, the Taurus, the Ghauts of Hindostan, the Caucasian, and the Ararat, near the Caspian Sea.

Russia in Asia.—This country occupies the whole of the northern part of the continent of Asia; including Siberia, the Kurile islands, and the countries on the Caspian.

Siberia is divided into two great governments, that of Tobolsk on the west, and Irkutsk in the east. This vast extent of land, containing 3,500,000 square miles, is not supposed to contain above 6,000,000 of barbarous inhabitants, chiefly Tartars, called Cossacks, Kalmucs, &c. A great portion of it being included in the frigid zone, its situation nearly excludes it from all communication with the civilized parts of the world, yet Russia has made exertions to improve it. The principal cities are Tobolsk and Irkutsk. The produce of the north consists of furs and skins; but in the south there is abundance of corn, fruits, wine, &c. The Obi is the chief river; the Lena and the Yenisei are also of great extent. The sea north of Siberia is filled with ice, and is commonly unnavigable.

The countries on the Caspian, and extending to the Black Sea, are chiefly Astrachan, Georgia, and Circassia. The last two are traversed by the great mountain range of Caucasus, the highest pinnacle of which, Elbourz, is 18,000 feet high. In its heights are many rude independent tribes. The Circassians are celebrated

for the bravery of the men and the beauty of the females. Numerous slaves of both sexes are imported from these countries into Persia and Turkey. The chief cities are Astrachan and Derbend on the Caspian; and Tefflis, the capital of Georgia. Most of this territory has been conquered from Persia.

Turkey in Asia.—This extensive territory includes the greater part of the ancient empires and kingdoms of Babylonia, Assyria, Armenia, Lydia, Syria, and Judea. It is bounded on the west by the Mediterranean, and the straits which connect it with the Euxine. On the north it has the Black Sea and the Caucasian territory. To the east is Persia; and to the south a portion of the empire, nominally at least, touches the Persian Gulf, but is circumscribed by Arabia. The Turkish Asiatic empire has been divided into Palestine (or the Holy Land), Syria, Asia Minor, and the provinces on the Euphrates. This country, interesting in an historical point of view, as being that portion of our globe where the transactions recorded in the earliest part of Scripture took place; is, owing to the jealous disposition of the inhabitants, but little known. The principles and mode of government are the same in Asiatic as in European Turkey. The pashas, invested with the command of extensive territories, receive entire the power of the despot from whom they derive their appointment. Even Asia Minor, now the centre of Turkish power, has been the seat of formidable rebellions; and Paswan Oglan long governed an extensive tract of its western districts with little or no control from the Porte. The more remote pashalics of Acra and Bagdad have almost shaken off the yoke. An attempt has been made by the pasha of Egypt to wrest these territories from the Porte; but its final issue is not yet ascertained. This state of things has rendered abortive the capacities given by nature to this region for the production of almost every species of wealth. In most of the districts culture is rendered insecure by the oppressions of the pashas, and the ravages of the Arabs, against which the government cannot, or at least does not, afford protection. Hence, in many parts, particularly in the tracts behind Jordan and Lebanon, and in Mesopotamia, which were formerly covered with the richest harvests, no traces of fertility remain, except in the overgrown and deserted pastures. The state of Asiatic Turkey as to religion, learning, and manners, so far as respects the ruling people, is similar to that of European Turkey. They present that austere, uniform, and gloomy character, which the precepts of Mahomet tend to form, and which is produced in its utmost purity in the cities of Turkey. The native and subject

races, however, exhibit marked distinctions. The high and uncultivated table lands in the interior of Asia Minor are occupied by a wandering and pastoral race called Turcomans. When summoned to fight under the banner of the empire, or to unsheath the sword against the infidels, they are prompt in obeying the call, and form the main military strength of Turkey. They serve a short campaign without pay, but with little ardour, and with full license of plunder.

The Chinese Empire is, next to Russia, the largest empire in the world; celebrated for the great antiquity of its government; for its crowded and industrious population; its fine manufactures, and some peculiar productions, (of which tea is the principal, and was almost the exclusive, article of import by the East India Company before the trade was laid open); for the extent of its inland navigation; and for its jealous and extensive commercial policy. This empire consists of three principal divisions; viz. 1. China Proper; 2. Chinese Tartary; and 3. The region of Thibet. The Corea, formerly considered a peninsula, but now discovered to be a group of small islands, is also subject to China, and is considered as a part of it. The empire is bounded on the north by Great Tartary; on the south by the ocean and the peninsula on this side the Ganges; on the east by the ocean; on the west by the Birman empire; extending about 4,900 miles in length, and 2,000 in breadth, and containing a population, according to the most authentic accounts, of more than 155,000,000 of souls.

*China Proper* extends from the Great Wall in the north, to the Chinese Sea in the south, and from the shores of the Pacific Ocean to Thibet. The chief cities are, Pekin, Nankin, Singan, and Canton. The Great Wall, though built two thousand years ago, is but little decayed: it is fifteen hundred miles long, and broad enough for five horsemen to travel upon it abreast. China contains rich mines of all the precious metals. It produces abundance of corn, rice, tea, and fruit; and is famous for its ingenious manufactures of silks, porcelain, earthenware, paper, &c. Its interior commerce is very vigorous, and the canals numerous and magnificent.

*Chinese Tartary* is included between the Great Wall of China and Siberia, and between the Must-tag, or Cloudy Mountains, and the Pacific Ocean. It is inhabited chiefly by the Mandshurs and Mongols, of the number of which we are destitute of all positive data; the former conquered China in 1644, and under their government the empire still continues.

*Thibet.*—Our knowledge of Thibet is extremely imperfect, and is confined to an account of the very few points which have been visited by European travellers. Lassa, or Hlassa, the capital, is situated in the finest part of Thibet; an extended valley bordered by stupendous mountain ranges. The city, independent of its chief ornament, which is the temple of Pootala, is represented as handsome and opulent. Here all the tops of the mountains are covered during the night with snow, which melts in the heat of the day, and thus fills the beds of numberless torrents. The sheep has a very thick and heavy fleece; the goat has at the root of his long shaggy hair, a very fine fur interspersed; while the cow has a substance of the same sort, little inferior in warmth and softness. The celebrated shawl goat is another peculiar production of Thibet. These creatures are of various colours, black, white, a faint bluish tinge, and of a shade somewhat lighter than a fawn. They have straight horns, and are of a lower stature than the smallest sheep in England. The material used for the manufacture of shawls, is of a light, firm texture, and grows next the skin, having over it a covering of long coarse hair, which preserves the softness of the interior coat. The most estimable product is gold, which is found nearly pure, in the form of dust, and sometimes in large pieces. Copper is drawn from the mines in considerable quantities, as a material for the manufacture of idols, gongs, and sacred instruments. The manufactures of Thibet are rude, and only adapted for immediate consumption; but commerce exists on a considerable scale, and under some striking aspects. It is entirely inland, and carried on through perils and difficulties, only equalled by those of an opposite nature, to be encountered in crossing the burning sands of Africa. Thibet thus maintains, however, a commerce of some extent, by the export of gold, tincal, musk, shawl-wool, and sheep-skins; while from Bengal it imports cloth, particularly woollen, tobacco, spices, and toys; from China, tea, porcelain, and silk.

The Chinese islands are very numerous, and scattered along the southern and eastern coast. The largest are Taywan, or Formosa, and Hainan. The islands of Loo-Choo, a considerable group, between Formosa and Japan, constitute a small kingdom, subject to China. The chief rivers of China are the Hoang-ho, and the Kiang-ku, each about 2000 miles long, and among the largest in the world.

The Japanese Empire.—Japan, which consists of three great islands, Niphon, Kiusiu, and Sikokf, surrounded by a multitude of smaller islands, forms an extensive, rich, populous,

and remarkable empire; the chief towns are Jeddo, Meaco, the spiritual capital, and Nangasaki. This empire trades only with the Chinese, and prohibits all other foreign intercourse under pain of death. The religion of the Japanese is idolatrous. The government is a monarchy, restrained by the priesthood. The whole population is 20,000,000, who live in a state of civilization; the arts and sciencies being much cultivated among them. The climate is fine, the face of the country beautiful, and agriculture is held in high estimation. In all respects the Japanese is a great and interesting empire; but, holding no intercourse, it is little known to foreign nations.

India is bounded on the west of Persia; on the north by Tartary and China; and on the east and south by the Indian Ocean; and derives its name from the river Indus. It has been divided into two great portions: the peninsula of India on this side the Ganges; and the peninsula beyond the Ganges.

*India beyond the Ganges.*—This comprises an immense tract of country, formerly very little known to Europeans, and which has recently been subject to great revolutions. It contains the British Territories, the Birman Empire, Siam, and the empire of Cochin China.

1. *The British territories* were obtained by treaty in 1826, shortly after the successful war against the Birmans. They consist of Assam, Arracan, Mergui, and Tenasserim, which, with Malacca, obtained from the Dutch in 1824, in exchange for some districts in the islands, comprehend nearly the whole eastern coast of the Bay of Bengal. They are in many parts fertile, but rudely cultivated. On a small island at the southern extremity, Britain has founded the town of Singapore, which has become remarkably flourishing. She has also founded Amherst Town, in Tenasserim; and has a settlement at Prince of Wales Island near Malacca.

2. *The Birman Empire* consists of the kingdom of Ava and Pegu, and was very powerful, till humbled in the late contest with Britain. It is traversed from north to south by the great river Irawaddy; and the territory is productive, particularly in teak timber, a valuable species, more durable than the European oak. The Burmese are brave, lively, and inquisitive. Ummerapoora was the capital till lately, when the seat of government was transferred to Ava. Before the Burmese war this empire comprised almost half the region described as India beyond the

Ganges; but at the close of that war Arracan, half of Martaban, Tavoy, Tenasserim, and the Mergui isles, were ceded to the British government, and Junk Ceylon, recovered by the Siamese, while Assam and all the adjacent petty states have been liberated from its yoke. The Burmese empire is subdivided into provinces and districts, of the internal state of which little is known. According to a Burmese account the provinces south of Prome contain 160 townships, and about 2,080 villages, with a population of 1,750,000. The commerce of this empire has been greatly extended since the conclusion of the war, and the occupation and conquest of a part of the territory by the British. The principal, and indeed, almost the only port of foreign trade is Rangoon.

3. *Siam* consists of a fertile valley between two ranges of mountains, and watered by the river Meinam. It is well fitted for sugar, rice, and other tropical products. Bankok, is the capital.

4. *Cochin China.*—The eastern countries of Cambodia, Tsiompa, and Tonquin, have all within the last thirty years, been subject to Cochin-China or Anam. The chief river is the Maykaung, which flows through Cambodia. Tonquin is the most fertile and populous of these countries; and its capital, Kesho, the largest of the cities; but both are little known.

*India within the Ganges, or Hindostan.*—The name Hindostan is Persian, and is derived from Hindoo, black, and st'han, place. This celebrated country has been famous, in all ages, for its civilization, produce, manufactures, and wealth. It contains about 140,000,000 inhabitants, more than 120,000,000 of which are either subjects, allies, or tributaries of Great Britain. It comprises the whole of what was once called the Mogul empire, the capital of which is Delhi. This empire is, however, now extinct, and much of its territories subject to Britain.

India, under British government, is divided into three presidencies: Calcutta, Madras, and Bombay. The presidency of Calcutta includes the provinces of Bengal, Bahar, Allahabad, Agra, and Delhi. Calcutta is now the largest city, ranking as the capital of Judea. The Presidency of Madras comprises the greater part of the coast of Coromandel, including the Carnatic, the Circars, and various other detached districts. Madras is a large city, though not equal to Calcutta. Bombay is the smallest of the presidencies, consisting of various detached districts in the west of India. The city of that name, situated on an island, is

the seat of a great trade, carried on both by British and foreign merchants.

The powers held in vassalage by Britain are chiefly the following:—the Nizam, or Soubah of the Deccan, who governs the greater part of that southern table-land so called. The Rajah of Mysore; its former rulers, Hyder and Tippoo, were the most inveterate enemies of Britain. Of the Mahratta princes, the Rajah of Sattarah had been dethroned and imprisoned by his generals, but Britain, after overcoming them, drew him from confinement, and assigned to him a considerable territory. The Rajah of Berar resides at Nagpoor, and is a determined enemy of Britain, but reduced to complete subjection. The king of Oude, who once ranked as vizier to the Mogul, still governs that fine province lying to the south of the Ganges. The Rajpoot chiefs, who rule over Ajmere, an extensive hilly province to the west of Agra, are rather protected by Britain than subject to her. The powers still independent of Britain are the following: Scindia, the most potent of the Mahratta chiefs; Nepaul, comprising most of the territory on the southern side of the Himalaya mountains; the Seikhs, a confederacy, once religious, and now political, who, under their chief, Runjeet Sing, are at present masters of the fine western provinces of Lahore and Moultan, on the Indus; Sinde, a flat but fertile territory, at the mouth of the Indus, and intersected by the branches of that river.

British India is ruled by the East India Company, who draw from it a revenue of about 22,000,000*l.* sterling, and maintain an army of 230,000 men, chiefly natives, called spahis, but more commonly sepoys, commanded by European officers. The Company had formerly a commercial monopoly, but the trade has been opened to all British subjects.

The chief rivers of Hindostan are the Indus, the Ganges, and the Burrampooter; the two latter rise in Thibet. The Ganges is held sacred among the Hindoos, and many religious rites are performed in it.

The Laccadive and Maldive islands, west of Hindostan and Ceylon, are unimportant, but very numerous. The Maldives are said to be more than three hundred in number. Ceylon, one of the largest and finest islands in the world, has lately devolved to the English, who have some valuable settlements on its coast at Trincomalee, Columbo, &c. Its capital, Candy, was taken by the English in 1815.

The productions of India are rice, sugar, cotton, silk, indigo, saltpetre, and precious stones, particularly diamonds.

The Hindoos are a mild and inoffensive race, and yet extremely

ingenious; the Mahometans, of which there is a considerable number, are less amiable, but more brave.

Persia.—This ancient and extensive empire, which has been a monarchy for nearly 2000 years, is 1400 miles long, and about 1000 broad; and is bounded on the east by India; on the south, by the Gulf of Persia; on the west, by Arabia and Asiatic Turkey; and on the north, by the Caspian Sea and Tartary. It is divided into Eastern and Western Persia, and the provinces near the Arabian Sea. Western Persia, or Persia Proper, is a distinct kingdom, and contains the provinces of Azerbijan, Mazanderan, Irak-ajemi, Khuzistan, Fars, Kerman, and Khorassan. The principal towns and cities are Teheran, the capital, Ispahan, and Shiraz. Eastern Persia includes Afghanistan, or the country of the Afghans, with the provinces of Segestan and Balk, all of which are included in the dominions of the king of Cabul, whose proper country is in Hindostan. Beloochistan, or the country of the Belooches, includes the southern provinces of Mekran, Kohistan, Sarawan, &c. Its capital is Kelat, situated in the latter, on the north-east. The intercourse of Western Persia with foreign nations is carried on from the Persian Gulf, an arm of the sea, in which are the islands of Ormus and Gombroon, once noted for their trade. From Persia are brought silks, carpets, leather, pearls, and gold and silver lace. It has numerous mines of gold, silver, iron, turquois stones, and salt; but the first two are not worked for want of wood. A great part of Persia, having suffered more than any country in the world from a succession of tyrants, has almost ceased to be a civilized country. It abounds in remains of antiquity.

Independent Tartary.—This extensive region includes the finest part of the country on the banks of the Oxus, and is celebrated as forming the greater part of Scythia, and of the ancient Persian empire. It was afterwards distinguished as the basis of the wide empire of Timur. It consists of an immense plain, many parts of which are barren, but in others numerous horses and cattle are reared, and their conquering armies consist chiefly of cavalry. The Tartars, though rude, are extremely hospitable. The chief divisions of Independent Tartary are—1. The territory of the Oxus, or Great Bucharia, once the seat of the empire of Timur; Bochara, now the chief city, contains 100,000 inhabitants, with a very extensive establishment for the cultivation of learning. Samarcand, though greatly declined from its ancient splendour, contains many fine buildings. 2. Ferghana,

on the Sihon, contains many fruitful plains, and the large cities of Koukan, Khojend, and Turkestan. 3. Balk, the ancient Bactria, on the southern side of the mountain range of Indian Caucasus. It is fertile, and Balk, the capital, is the seat of a great inland trade. 4. Khiva, to the east of the Caspian. 5. Extensive plains, or steppes, in the north, are tenanted by the four hordes of the Kirgises. The chief rivers of Tartary are the Jihon, or Oxus, and the Sirr, or Sihon; and the most considerable lake, or inland sea, is that of Aral.

Arabia, by its position, formed a kind of central country in the ancient world, and at one time it was a grand emporium by which the most distant nations were connected. It forms a great peninsula, about 1600 miles long and 1400 broad, and consists chiefly of sandy deserts. The Arabians generally live under tents in the open air, and some of them are robbers, others are shepherds. The few who reside in towns apply to commerce. The climate is, in some parts, hot and dry, and subject to poisonous winds. In other parts the soil is fertile, and the air salubrious. In the great deserts, travellers guide themselves by the stars and compass, as mariners do at sea. In the seventh century, Mahomet spread his conquests from Arabia over great portions of Asia and Africa. Within the last fifty years great changes have been produced in the religion of Arabia, by Abdal Waheb, whose numerous followers are called Wahabees; but they have been subjugated by the pasha of Egypt.

Arabia has been divided into three parts: Arabia the Stony, Arabia the Desert, and Arabia Felix, or the Happy. But these divisions are imperfect, and the following are the principal recognised in the country itself: 1. Hedjez. 2. Yemen. 3. Ommon. 4. Nedjed. Hedjez is a territory in general rude and rocky, though it contains some well inhabited valleys. The chief places are Mecca, the birth-place of the prophet Mahomet, and Medina, the place at which he was buried.—Yemen, on the south-western coast, merits the appellation of the Happy Arabia; Sena is the capital, but Mocha and Aden are the chief seats of commerce.—Ommon contains a number of sea-ports; among others, the great maritime and commercial state of Muscat.—Nedjed forms the most interior part of Arabia, where the genuine Arab character most distinctly appears. Nedjed was the chief seat of the power of the Wahabees, and suffered severely in their downfal. Deraie, its capital, was then laid in ruins.

Arabian horses are much esteemed. Camels and dromedaries are the common beasts of burden. The coffee of Arabia is

superior to that of all other countries, and its chief article of export. The only fruit of the desert is the date, which supplies the Arab with a considerable part of his scanty meal.

The Eastern Archipelago.—The immense cluster of islands, called the Oriental or Eastern Archipelago, is divided into, 1. The islands of Sunda, or the Sumatran chain, which comprise Sumatra, Java, Bally, Lombock, Flores, and Timor, with several others of less magnitude. Java, the richest and most populous, contains about 6,000,000 people. 2. Borneo, and some small surrounding islands. Borneo is the largest island in the world, excepting Australia, which comprises New Holland, and New South Wales.—3. The Manillas, or Philippine Islands, including Luzon, Mindanao, Palawa, Mindora, Pany, Negros, Zebu, Leyte, Samar, and several hundred smaller islands.—4. The Celebesian Isles, viz. Celebes, Boeton, and the surrounding small islands. Boeton is governed by a Mahometan sultan.—5. Moluccas, including the Spice Islands: these are Gilolo, Ceram, Bouro, Oby, Amboyna, Banda, Tidore, Ternate, &c., which produce nutmegs, cloves, and other valuable spices. These islands lie under the equator, and are the hottest regions in the world; they are full of inhabitants, who are half civilized, but in a state of slavery. The Dutch are almost masters of this Archipelago.

Under the head of Asia it has been customary with geographers to include that labyrinth of islands, situate in the Northern Ocean, including Australasia and Polynesia, to which the French have recently given the name of Oceanica. There seems, however, a marked characteristic distinction between these portions of the globe, and the old continent or islands of Asia. It has, therefore, been latterly considered a separate grand division of the globe.

Nature has given this part of the world a very prominent and characteristic physiognomy. No portion of the surface of the globe has more numerous inequalities, and in none, except America, have the chains of mountains so striking a polarity, so marked a direction from north to south; at the same time, these chains generally present, about the middle, a great bend from west to east. Among these thousands of islands, some shoot up to a considerable elevation, generally presenting a conical form; many of them, according to Foster, are basaltic. The centres of the mountains often contain wide tunnels, and at other times round lakes, which may be taken for ancient craters. Although the presence of volcanic substances has not everywhere been ascertained

by satisfactory evidence, we know already in Oceanica a greater number of volcanoes than in any other part of the world. Sailors sometimes speak of them with admiration, at other times with terror. In one place, as in Shooten's Islands, near New Guinea, the flames and the smoke rise calmly over a fruitful and smiling country; in another, as in the northern part of the Marianne Islands, dreadful torrents of black lava darken the shore.

All the low islands seem to have for their base a reef of coral rocks, generally disposed in a circular form. The middle space is often occupied by a lagoon; the sand is mixed with pieces of broken coral, and other marine substances; proving that such islands have been originally formed by these coral rocks, which are inhabited, and, according to some, created by polypi, and afterwards augmented and elevated by the slow accumulation of light bodies drifted to them by the sea. It is, however, very remarkable, that among the islands so constituted, some are almost level with the sea, while others have hundreds of feet of elevation, of which last Tongataboo is an example. On their summits are found coral rocks, produced in the same manner with those found at the water's edge. Now the madrepores, millepores, and tubipores, which raise these submarine habitations, (for the true coral polypus is never found there,) grow over the hardened spoils of their dead predecessors. They cannot live above the level of the sea,—a circumstance which shows that the sea, at a former period, washed these rocks, and gradually retired and left them exposed. The reefs render the navigation of this ocean exceedingly dangerous. In some of its seas these rocks reach the surface, while in others they lie dangerously concealed, having over them only a few feet of water. Captain Cook was neither able to foresee, nor avoid such dangers. It happened at one time, by a singularly fortunate accident, that the point of a rock, which had pierced his vessel, was broke off, and by sticking in the place, saved the vessel from destruction.

The geographical description of this new and important part of the globe may at present be considered as very imperfect. The following are the usual divisions:—

Australasia.—The islands comprehended within the space denominated Australasia, are as follows:

1. Australia, which is under the dominion of Great Britain, and divided into two great parts, New Holland and New South Wales, by the meridian of 135 degrees east. Australia is about three-fourths of the magnitude of all Europe, but has not yet been fully explored; a great portion is desert, but other parts, in

different directions, are fertile and beautiful, and all under an auspicious climate. On the south-eastern side of Australia is the colony of Port Jackson, near Botany Bay, containing the flourishing town of Sydney, the capital. Besides this, there are the new settlements of Swan River, and South Australia.

2. Van-Dieman's Land, separated from New South Wales by Bass's Strait or channel. The British population in this island is rapidly increasing. Several towns have been laid out, and its capital, Hobart, on the south-east, upon the river Derwent, is finely and most advantageously situated for all the purposes of commerce.

3. New Zealand, consisting of two islands east of Australia.

4. Papua, or New Guinea, and the Papuan Isles.

5. New Britain, New Ireland, and the Solomon Isles.

6. New Caledonia, and the New Hebrides.

Polynesia.—Of the cluster of islands in the great Pacific Ocean, called Polynesia, the following are the principal:

1. The Ladrone, or Marianne Islands, the chief of which are Guam and Tinian. 2. The Carolinas, the largest of which are Hogole and Yap. 3. The Sandwich Islands, discovered by Captain Cook, at the largest of which, Owhyhee, that great navigator lost his life. 4. The Marquesas, which are very numerous. 5. The Society Islands, about sixty or seventy in number: Otaheite is the largest. 6. The Friendly Islands, the Fidjee or Fejee, and the Hervey Islands.

Most of these were discovered within the last century. The inhabitants generally live in great simplicity, approaching to a state of nature, in a fine climate, and in fertile countries. Many of them, by means of the different Missionary Societies, have received the knowledge of the gospel, and consequently have made some advances towards a state of civilization.

## Africa.

Africa, called by the ancients Libya, though now reduced to a state of general barbarism, once contained kingdoms and states eminent for arts and commerce. Egypt and Ethiopia were much celebrated; and Carthage, the rival of Rome, standing near the place now occupied by the city of Tunis, extended her commerce over every part of the known world. Africa is bounded on the north by the Mediterranean Sea; on the east, by the Isthmus of Suez, the Red Sea, and the Indian Ocean; on the south, by the Southern Ocean; and on the west, by the Atlantic. Though denominated

a continent, it is in reality a vast peninsula, extending from north to south about 4900 miles, and from east to west about 4500. The most striking features of Africa are its immense deserts, inhabited only by wild beasts, and its impenetrable forests in other parts, which leave only small portions for the labours of agriculture. As for the climate, lying chiefly within the torrid zone, it is excessively hot. The periodical rains, however, cool the air, cause some of the rivers to overflow their banks, and fertilize the adjacent plains. The principal rivers in Africa are the Nile, the Niger, the Zaire, the Gambia, the Congo, and the Senegal. The Niger, whose course and termination has so long been the subject of investigation, and to which many valuable lives have been sacrificed, has been ascertained at length, by the indefatigable Lander, to fall, by numerous estuaries, into the Gulf of Benin. The chief mountains of Africa are the Atlas mountains, which reach from Morocco to Egypt; the mountains of the Moon; Sierra Leone, or Lion's Mountains; and the Peak of Teneriffe. The chief productions of Africa are gold-dust, ivory, gums, drugs, and slaves; for though the slave-trade, as respects England, is now abolished, that abominable traffic is still continued throughout the greater part of the interior of Africa.

No general character can apply to a whole continent like Africa, but where barbarism so universally prevails, all the vices belonging to ignorance may be expected to abound. The population consists chiefly of Moors and Arabs, who are Mahometans, and Negroes and Caffres, who are pagans. There are but few Christians on this extensive continent, which, though it has recently been explored in various parts, is still but imperfectly known to Europeans.

War is carried on throughout the interior of Africa with the ferocity which characterises the proceedings of the most barbarous nations, but the peculiarity of African warfare is, that its ultimate object is slavery. The commerce and internal policy of almost every country in Africa also centre in this inhuman traffic. The Portuguese were the first Europeans who embarked in it. In imitation of those piracies, which existed in the uncivilized ages of the world about the close of the sixteenth century, they commenced this practice by making descents on Africa, and committing depredations on the coast. The practice, thus inconsiderable at its commencement, afterwards became general; and our ancestors, together with the Spaniards, French, and most of the maritime powers of Europe, soon followed the piratical example. The unfortunate Africans fled from the coast, and sought, in the interior part of the country, a retreat from the persecution of their invaders: but the Europeans still pursued them; they entered

their rivers, sailed up into the heart of the country, and carried them into slavery. The next step was that of settling in the country; of securing themselves by fortified posts; of changing their plan of proceeding by force into that of pretended liberality; and of opening, by every species of bribery, a communication with the natives. The scheme succeeded; an intercourse took place between the Europeans and Africans, and at length a treaty of peace and commerce was concluded, which stipulated to supply the Europeans with captives and convicts; but these were not sufficient for their demand. In order to augment the number, they delivered into slavery, not only those who were taken in a state of public enmity and injustice, but those who were suspected. To the influence of this abominable traffic must be attributed that total ignorance of the interior of Africa, which existed till within the last few years. How far the recent attempts to abolish slavery in our colonies will affect this inhuman system, remains yet to be decided.

Africa may be considered in the following order: Egypt; Abyssinia; Central Africa; the Mahometan states in the north, called Barbary; the nations on the western coast; the colony of the Cape of Good Hope in the south; and the eastern kingdoms opposite Madagascar.

Egypt, called by the Arabs *Mezr*, by the Copts, *Khemi*, and by the Turks, *El Rabit*, consists of a narrow vale on both sides of the Nile, bounded by parallel ridges of mountains or hills. It is divided into Upper, Middle, and Lower, which last comprehends the Delta formed by the lower branches of the Nile, and famed for its fertility. It was once the seat, if it were not the parent, of the sciences. Its temples, pyramids, and tombs, the monuments of its ancient grandeur, are of stupendous magnitude, surpassing those of any other country. Many of the walls are entirely covered with sculptures, paintings, and hieroglyphics. Egypt sunk into great degradation beneath the Turkish dominion; but it is reviving under Mohammed Ali, its present ruler. He has shaken off the yoke of the Porte, and has even conquered Nubia, besides great portions of the Turkish dominions in Asia, so that he is now at the head of a considerable empire.

Grand Cairo, the capital of Egypt, is a large and splendid city. The ports are Alexandria, Rosetta, and Damietta.

Nubia is a long narrow range of territory, extending upwards along the Nile. To the south-east are Kordofau, and Darfur, rude countries, inhabited by a barbarous people.

Abyssinia is an extensive country to the south-east of Nubia. It is politically divided into three distinct and independent states. 1. Tigre, the most powerful, occupying nearly four degrees of longitude on the Arabian Gulf, and extending inland to the river Tacazze; capital, Antalo. 2. Amhana, comprising the country west of the Tacazze; the capital is Antalo. 3. Shoa and Efat, situated to the southward of the two former, and separated from them by a nation called Galla, embracing some of the finest districts in Abyssinia, and supposed to contain a greater portion of Ethiopian literature than any other part; the capital is Ankober. The population of Abyssinia is about 7,600,000. The country is very mountainous; and many of them have a singular appearance, resembling the ruins of ancient walls, towers, and cities; and in some places they are so steep and abrupt, as to be ascended only by ropes and ladders. The climate, in general, is temperate and healthy, the elevation of the country moderating the heat of its southern latitude. It has great variety of soil, and its products are diversified; among them may be named the papyrus, the plant from which paper was first made by the Egyptians, after the disuse of hieroglyphics; and the balessan, or balm of Gilead. No country in the world, it is said, possesses a greater variety of animals, both wild and tame. The number of birds in this country is also immense. The Abyssinians are generally of a dark olive complexion, tall, graceful, and well featured. Some of the tribes are fairer than others, approaching even to white; others are of a copper colour; and some very black. The manners of the Abyssinians are represented by Mr. Bruce as highly barbarous. Their continual warfare inures them to blood from their infancy, so that even children would not have the least scruple at killing one another, if they were able.

Central Africa.—This term is now employed to designate an extensive and fruitful region in the interior of Africa, formerly almost entirely unknown, but which has within the last few years been explored by many enterprising travellers, most of whom have sacrificed their lives in their efforts to correct the geography of this extensive region. It is found to consist of immense tracts, separated from the countries on the coast by vast forests and deserts, but comprising the most improved and comparatively civilized nations of that great continent. The continued range of the mountains of the Moon, under various names and aspects, crosses it from west to east, and gives rise to the Niger, with its tributaries, and the other great rivers, which unite in forming the lake Tchad. The inhabitants consist partly of Negro nations,

who are more industrious and intelligent than in other parts of Africa; partly of Moors and Fellatas, whose ancestors migrated from Egypt and Barbary.

This region is divided among many nations, which cannot be here fully described; but the following are the principal:—Bornou is an extensive plain, immediately west of the lake Tchad, and watered by the river Yeou. Next to Bornou is Loggun, on the river Shary, which falls into the Tchad; and Mandara, a fine plain at the foot of a vast range of mountains. The inhabitants are Mahometan Negroes.

Houssa is a fine and extensive region to the west of Bornou. The Fellatas, who inhabit it, are an industrious and intelligent, as well as warlike race. The sultan of Soccatoo holds at present supreme sway over the states composing Houssa, which were conquered by his predecessor. They are chiefly Kashna, Kano, Zegzeg, Goober, and Zamfra.

The countries on the lower Niger, recently explored by Lander, being well watered, and in many places inundated by that great river, are extremely fruitful; but in approaching the sea, they become marshy and unhealthy. The Niger rolls here a magnificent stream several miles broad, resembling an inland sea; it receives the Tshadda, almost as large as itself, flowing from countries unknown. The people are brave; but the king has incurred just reproach by the attack which terminated in the death of Park, and by the extortions practised towards Lander. Boussa, Kiama, Wawa, and Niki, are also considerable states. Yarriba, having Eyeo for its capital, is a very large and populous kingdom. Nyffe, on the opposite or eastern side of the Niger, is distinguished for manufacturing industry, its cloths and mats being superior to any other made in Africa. The countries on the Upper Niger are also rich and industrious. Timbuctoo has been long celebrated as the seat of the caravan trade with Morocco for slaves and gold. Bambarra is a fine plain watered by the Niger; and Sego, its capital, is large and flourishing. Jinné, Sansanding, and Walet, are also great seats of inland trade.

Barbary extends along the Mediterranean, from the Atlantic to Egypt, and includes the Mahometan states of Tripoli, Tunis, Algiers, and the empire of Morocco; to which some geographers also add the kingdom of Barca. It forms a beautiful and fertile region, once flourishing, but long sunk under tyranny and oppression. The population of Barbary is chiefly composed of four classes: the Brebers, or ancient inhabitants, the Moors, the Jews, and the Arabs. The most atrocious piracies were carried on from the sea-ports; but these have been suppressed by

Britain; and the French have now taken possession of Algiers, the chief seat of these outrages, and are endeavouring to colonize the territory.

Western Africa.—Under this name is comprised that wide range of coast, excluding the great desert, from the Senegal river to the river of Benguela, extending 4000 miles in length, with an average breadth of 300 miles. It consists of innumerable tribes of people, and various kingdoms, through which flow the rivers Senegal and Gambia, on which are many European forts and settlements. Sierra Leone, which includes Freetown, is an English settlement in Guinea, formed for the civilization of the interior of Africa. Guinea is divided into the Grain, the Ivory, and the Gold-coasts, which, notwithstanding the efforts made by the friends of humanity, still continues to supply Europeans with slaves. It contains the extensive kingdoms of Ashantee and Dahomey. From this coast, gold and ivory are the chief exports. Farther south, Benin, Loango, Congo, Angola, and Benguela, present the most interesting objects, and are all peopled with half-civilized Negroes. There are several Portuguese settlements.

Southern Africa contains not only the colony of the Cape of Good Hope, but also those immense tracts of country, in the interior to the north, as far as they have been explored. The Cape of Good Hope was first founded by the Dutch, but now ceded to England. Cape Town contains 20,000 inhabitants. To the north are the pastoral tribes of the Boshuanas. On the eastern coast are the Caffres; north from them are the Zoolas, a most ferocious tribe, who have lately committed dreadful ravages in this part of Africa; on the eastern coast, the Portuguese have Mosambique, Sofala, and Quillimane, at the mouth of the great river Zambese. Farther north is Zanguebar, which has been dreadfully ravaged by the Galla. Near the coast are the flat fertile islands of Zanziber, Pemba, and Monfia. Farther north is the arid and desolate coast of Ajan; but Berbera, west from Cape Guardafui, is noted for the production of incense and odoriferous plants.

To the east of Africa lies the island of Madagascar, one of the largest in the world. Off the west is the isle of St. Helena, an English colony, and a desirable port; become famous as having been the residence of the Emperor Napoleon. Off the eastern coast of Madagascar is the French island Bourbon; and to the eastward of the latter is Mauritius, or the Isle of France, now belonging to Great Britain. The Cape de Verde Islands are ten in number,

subject to the Portuguese; the two largest are St. Jago and St. Antonio. More northerly are the Canary or Fortunate Islands; among these is the famous Peak of Teneriffe, two miles and a half in perpendicular height. The island of Madeira, still farther north, is famous for its wine and healthful climate.

## AMERICA.

America is a great continent, often called the New World, and comprehends nearly all the land in the western hemisphere. It was first discovered, in 1493, by Christopher Columbus. a Genoese in the service of Spain; but received its name from Americus Vesputius, a Florentine, who made a voyage to this continent four years after. It is divided into North and South America, which are connected by the Isthmus of Darien; and extends about 9000 miles in length, and 3700 at the greatest breadth, passing through every change of climate, and possessing every variety of soil.

## NORTH AMERICA.

North America includes—1. Greenland, which belongs to Denmark. 2. British America, comprising New Britain, which includes a vast extent of country west of Hudson's Bay, and Labrador, or country of the Esquimaux; on the east, Upper Canada, Lower Canada, New Brunswick, and Nova Scotia. 3. The Russian possessions in the north-west. 4. United States. And 5. Mexico and Guatemala. By a wise provision, this very extensive tract of land is furnished with a number of inland seas and lakes, which render the different parts of it accessible to each other, and greatly facilitate commerce. The inland seas of North America are the gulfs of Mexico, California, and St. Lawrence, with Hudson's Bay and Straits, Baffin's Bay, and Davis's Straits. The lakes Superior, Ontario, Erie, Michigan, Winipeg, and the Slave Lake, are the largest in the world, and may, with propriety, be denominated inland seas. The rivers are also magnificent features in North America. Of these the principal are the Missouri, Mississippi, the Ohio, the Hudson, the Chesapeake, the Delaware, the St. Lawrence, and the Columbia. The gulf of St. Lawrence is formed, on the east, by the island of Newfoundland. On the south-east of the latter is a great sand-bank, 500 miles in length, celebrated for the cod fishery. The mountains are the Rocky, among which the Missouri and Columbia take their rise; and the Alleghany, which contain the source of the Ohio.

The United States.—This extensive republic, exclusive of Louisiana, an immense tract, purchased from the French, and now a separate state, is 1650 miles in length, 1250 in breadth. The United States are famed for their industry and spirit of commerce, as well as for the excellency of their political constitution. The greater part of the inhabitants sprung from English settlers, though there are many descendants of Germans, Dutch, and Swiss. Including black slaves, they amount to nearly 13,000,000. These states are in a very flourishing and improving condition, and promise to become, on the abolition of that slavery which they now tolerate, the most powerful and happy community in the world. They export vast quantities of timber, pitch, potash, skins, corn, tobacco, rice, and cotton, and their ships are to be found in every part of the world.

The Republic of the United States is governed by a president, chosen every four years, and is divided into the Northern, Middle, and Southern States—twenty-eight in number.

The Northern States are, Maine, capital Portland; Vermont, Montpellier, New Hampshire, Concord; Massachusetts, Boston; Connecticut, Hartford and Newhaven; Rhode Island, Newport and Providence; and Columbia, Alexandria.

The Middle States are, New York, chief city New York; New Jersey, Trenton; Pennsylvania, Philadelphia; Delaware, Dover; Ohio, Cincinnati; Michigan, Detroit; Indiania, Indianopolis; Illinois, Vandala; and Missouri, St. Louis.

The Southern States are, Maryland, Baltimore; Virginia, Richmond; Kentucky, Louisville; North Carolina, Charleston; South Carolina, Columbia; Georgia, Savannah; Tennessee, Nashville; Alabama, Mobile; Mississippi, Natchez; Arkansas, Little Rock; Louisiana, New Orleans; and Floridas, St. Augustine.

Floridas has recently been ceded by the Spanish government, being 400 miles in length, and with about 10,000 inhabitants. Its chief towns are St. Augustine, the capital, and Pensacola.

The chief cities and towns in the Union are Washington, the capital, Philadelphia, New York, Boston, Baltimore, Charleston, and New Orleans. The rivers of the United States are large and numerous. The Mississippi, Missouri, Chesapeake, Delaware, Hudson, and Ohio, are the most considerable.

Mexico, formerly subject to Spain, but now forming a new independent republic, was celebrated for its mines of silver. It is extremely fertile, and the valleys, especially, produce almost all kinds of fruits. Mexico, the capital, is a spacious and magnificent

city, seated on several islands in a salt water lake, called Tescuco, to which there is no entrance but by three causeways, two miles in length each.

Guatemala is a small state to the north of the Isthmus of Darien, which has separated from Mexico, and assumed the title of Central America.

British America.—In North America the British dominions comprise an assemblage of vast, ill defined, and straggling territories, the remnant of that mighty empire, of which the great insurrection deprived Britain. Even in their present dismembered state, however, their extent and capacities might, and probably will, enable them one day to surpass the greatest of the now existing European monarchies. They include Labrador, Lower and Upper Canada, with half of the great lakes Ontario, Erie, Huron, and Superior; also Nova Scotia, New Brunswick; the isle of Cape Breton, Newfoundland, the Bermudas, and other islands. The chief cities are Quebec, Montreal, Toronto, formerly York, Halifax, Shelburne, Fredericton, and St. John's. The climate is severe, exceeding what is felt under the same latitude in the old continent. The population of the British American provinces, according to the latest enumerations, made mostly between 1827 and 1832, was as follows: Lower Canada, 1831, 511,917; Upper Canada, 1832, 257,814; New Brunswick, 72,932; Nova Scotia and Cape Breton, 142,548; Prince Edward Island, 23,473; Newfoundland, 60,088: total, 1,068,772. This northern part of North America is mountainous and barren, abounding with lakes, rivers, and bays, that afford plenty of fish. The timber, fur-trade, and fisheries, constitute their chief value to Great Britain.

*Native Tribes.*—Numerous small tribes or hordes, of from 500 to 5000 each, occupy the vast extent of country from the United States to the Pacific Ocean; also Greenland, Labrador, the regions around Hudson's Bay, and along the western coast,—all in a barbarous condition, and depending on the uncertain produce of the chase. By the encroachments of the inhabitants of the United States, and the policy of the government, these tribes of aborigines are, however, gradually becoming extinct. In the most northern parts of this immense continent, many new discoveries have been made within the last few years: these are chiefly the result of several expeditions sent out by the British government for that purpose, at various periods, since the year 1818 to the present time, under Captains Ross, Parry, Franklin,

and others. The chief object of these expeditions was, to ascertain the existence of a north-west passage from Baffin's or Hudson's Bay to the Pacific Ocean, and to explore more fully the region of the north pole. The last of these voyages was performed between the years 1829 and 1833, under the direction of captain. now Sir John Ross, and his nephew, Commander Ross. Although the expedition was fitted out under the patronage of a private gentleman, Sir Felix Booth, the officers and men were subsequently remunerated by the British government. From the published account of this expedition, as well as those of former voyages, it appears that there is, without doubt, a passage into the ocean, clear of all obstructions except those of climate; but that these at present seem to render it impracticable for regular mercantile enterprise.

The northern coast of America thus recently explored, bordering on the vast expanse of the Arctic Ocean, is inhabited by the Esquimaux, a race quite different from the Indians, and comparatively laborious and peaceful. They subsist by fishing, and chasing the wild and amphibious animals which abound on this coast. In the ocean to the north of America, Captain Parry dicovered a range of large islands, of which the principal have been called Melville, Bathurst, and Cockburn. They are uninhabited, the climate being extremely severe, and in winter only a few of the most hardy animal tribes are able to subsist.

The West Indies.—This term is usually applied to an archipelago of large and fine islands situated in the wide interval between North and South America. The most valuable of them are in the possession of Great Britain, and together with the provinces of British Guiana and Honduras on the continent, are frequently included under the general term of West Indies. The most extensive of these islands are Cuba, chief town Havanna, and Port Rico, belonging to Spain; Hayti, or St. Domingo, next to Cuba both in magnitude and position, now an independent republic of blacks and people of colour, and Jamaica, belonging to England, the chief towns of which are Kingston and Port Royal. North of Hayti and Cuba are the Bahamas, belonging to England, the principal of which is Providence Island. The Caribbees extend from Trinidad in the south to the Virgin Islands in the north; and are also called the Windward Islands, or Antillas. Of these, since the treaty of Paris, 1814, the English islands are Barbadoes, Tobago, Trinidad, Grenada, the Granadines, St. Vincent, St. Lucia, Dominica, Montserrat, Antigua, Berbuda, St. Christopher's and Nevis, Anguilla, Virgin-

gorda, and Tortola, with several smaller isles. The French islands are, Martinico, Guadaloupe, Mariegalante, Thomas, and St. John's; the Dutch, St. Eustatius, Saba, and part of St. Martin's. To the latter, also, belongs the leeward island Curaçoa, off the coast of Venezuela. The island of St. Bartholomew belongs to Sweden.

Rich products, high cultivation, and the very singular form of society existing in the West Indies, have rendered them, in modern times, peculiarly interesting. The splendour of the vegetation in the islands of the West Indies is the theme of every traveller who visits them. Few plants are more extensively valuable than the mahogany, (*swietenia mahagoni*), which is an important article of export. With regard to the banana, or plantain, it is to be doubted whether there is another plant in the world which, on a small space of ground, produces such a mass of nourishing substance; and the facility with which the banana is raised makes it even preferable to the bread tree. So fine are the climate and soil of these islands, that tropical plants, from all parts of the world, are readily cultivated.

The population of the different portions of the West Indies has been ascertained with varying degrees of accuracy: the following may be regarded as a near approximation of the whole:— Spanish islands, 1,000,000; British, inclusive of Demerara, 788,000; Hayti, 800,000; French islands (inclusive of Cayenne), 222,000; other European islands (including Dutch Guiana), 150,000; of these it is probable that not above 500,000 are Europeans. The social state of these islands is peculiar and painful. The population formerly consisted chiefly of three portions, between which scarcely any sympathy existed: 1. The whites. 2. The slaves. 3. A mixed population of coloured people. The whites, who form but a small part of the population, are the masters, in whom all the power and property centre. They consist partly of proprietors, superintending the cultivation of their own lands, partly of agents and overseers employed by owners residing in Britain. The slaves, who formed the most numerous part, and who were continually under the lash of a task-master, are now in most of the islands set free. By the late act for their emancipation, it is hoped that the sufferings which they have endured will in due time be removed. The character and deportment of the freed negroes have hitherto been on the whole exemplary.

An uncommon measure of wealth and prosperity was for a long time enjoyed by these islands. They flourished especially during the last century, when they supplied almost exclusively

sugar, coffee, and other articles, the use of which had become general over the civilized world. After the French revolution, and that of the negroes in St. Domingo, the islands belonging to Britain became almost the sole quarter whence Europe was furnished with West India produce. Plantations, according to Mr. Hibbert, vary from 500 to 1000 acres, and from 100 to 500 negroes. The exportation of rum in 1832 amounted to 4,753,783 gallons, the value of which, at 2*s.* 9*d.* a gallon, would be 753,644*l.* Of this amount, 3,513,000 gallons, retained in Britain for home consumption, paid a duty of 1,570,000*l.* Coffee ranks next to sugar in importance, and though introduced from a remote quarter of the world, has been cultivated with such success that the coffee of Berbice and Jamaica ranks next to that of Mocha. The exportation to Britain in 1832, amounted to 24,600,000lbs. the value of which, at 6*d.* per lb., may be 685,700*l.* A few other articles are produced in these islands. Cotton was formerly considered one of their staples. In 1786, the produce was 5,800,000lbs. but in 1831 and 1832, it averaged only 1,950,000lbs. Cacao, the principal material of chocolate, has also much declined, chiefly, perhaps, on account of that beverage being almost entirely disused in Britain. The average of export in 1831 and 1832 was 1,050,000lbs. These islands supply the British empire with nearly all the sugar, rum, and coffee consumed in it. The West Indies also carry on an extensive intercourse with the United States, and the British colonies in North America, to which they send their staple productions, and receive in return grain, provisions, fish, and timber. The trade with the British colonies employed in 1831, 486 ships, of 75,896 tons, with 5074 men outwards. That from the United States, in the same year, employed, according to Mr. Bliss, 58,825 tons, of which more than two-thirds were American. The imports into our West India colonies from Great Britain consist of coarse cottons, linens, checks, hats, and other articles of negro clothing, hardware and earthenware; staves, hoops, coal, lime, paint, lead; Irish provisions, herrings, and other salt fish, &c., with furniture, wine, beer, and medicine.

## SOUTH AMERICA.

The greater part of this immense tract of territory was formerly under the dominion of Spain and Portugal; but within the last twenty years the inhabitants have revolted from the parent countries, and formed themselves into independent governments, some of them of immense extent and internal resources.

South America is best known for its gold and silver mines, which have been wonderfully productive to Spain. The choicest gums and drugs are likewise found in various parts of this immense continent. The rivers Amazon and La Plata are celebrated as the largest in the world. Both of them rise among the Andes, and their course is some thousand miles in length. The Oronoco is also of considerable magnitude. The mountains of South America are some of the loftiest on the globe, and have many volcanos among them. The Andes run from north to south, and extend 4600 miles. The highest is nearly four miles high, and they are covered with perpetual snow.

The parts of South America which formerly belonged to the Spaniards are the finest and richest of the whole continent. These now form the republics of Columbia, Peru, Chili, and La Plata.

Columbia is the most important of the new republics, and that which earliest shook off the Spanish yoke. It contains a number of considerable cities, among which are Caraccas, Cumana, and Carthagena, on the northern coast; Panama and Porto Bello on the opposite sides of the Isthmus of Darien; Santa Fé de Bogotá, Quito, and Popayan, in the interior; and Guayaquil, on the South Sea. The population is about 2,800,000. The principal articles of export are cacao, indigo, tobacco, coffee, hides, and cattle. The imports are manufactured goods.

In consequence of the recent changes, Columbia is now subdivided into three separate portions; and though the boundaries of this subdivision are too ill defined, and its permanency too uncertain, to admit of its superseding the general appellation of Columbia, yet the subdivisions require to be noticed. This state is now divided into the three separate republics of New Granada, comprising the ancient viceroyalty of that name; the Equator, composed of Quito and the adjoining territories; Venezuela, comprehending the great plain east of the Andes, and bordering on the sea.

Peru, Upper and Lower.—This was formerly one of the five viceroyalties while under the Spanish government, and is celebrated as the seat of the mild and civilized empire of the Incas. It now forms two republics, Peru, and Bolivia, called also Upper Peru. The country is distinguished by mines of silver and mercury, which were the richest in the world, but have greatly declined in value. Peru may contain about 2,500,000 people. Lima, its capital, is the most splendid city in South America. Cusco is the ancient capital of the Incas.

Chili, to the south of Peru, consists of a long, narrow, but very fertile plain, between the Andes and the ocean. It is about 1400 miles long, and from 100 miles to 200 miles broad. The population is stated to be 1,200,000. It contains mines of gold and copper. Santiago is the capital; but the chief trade is from the ports of Valparaiso, Conception, and Valdivia.

La Plata consists of an immense plain, watered by the river of that name, and reaching nearly across the continent, from the Atlantic to the Andes. Buenos Ayres, the capital, is at the mouth of the La Plata, and the chief interior towns are Cordova and Mendoza. Monte Video, with its territory south of the La Plata, forms now a separate republic, called the United Provinces of La Plata. Buenos Ayres, the capital, sometimes gives name to the new republic.

Brazil is a country of vast extent, and one of the richest regions of the earth. It was formerly subject to Portugal, but is now an independent state, or empire, governed by princes of the house of Braganza. The dimensions of this immense range of territory are about 2,300 miles of extreme length, and 2,000 of breadth. The area of the whole has been estimated by Humboldt, after careful measurement of the best maps, at 257,000 square marine leagues, or 3,304,000 square miles. It is thus twenty-five times the extent of the British islands, nearly three times that of Mexico or Columbia, and greater by a fourth than the entire domain of the United States, from the Atlantic to the Pacific. It is rather more than half of all South America.

It contains mines of gold, silver, and diamonds, and is well situated for commerce with all parts of the world. The chief cities are Rio de Janeiro, the capital, Bahia, or San Salvador, and Permambuco; both the latter are flourishing sea-ports. The population of Brazil is nearly 5,000,000.

The parts of South America still in possession of savage native tribes, are Amazonia, or the country on the river of the Amazons; and Patagonia, a desolate country near the southern extremity of America, formerly said to be inhabited by a gigantic race; and Guiana, which is divided among different European nations. The English have Demerara and Berbice; the Dutch, Surinam; and the French, Cayenne, famous for its pepper. The islands contiguous to South America are, the Falkland islands, Terra del Fuego, Juan Fernandez, the Galapagos, and the Pearl islands, near Panama.

# CHAPTER X.

## ASTRONOMY.

ASTRONOMY is the science which explains the forms, motions, distances, and other phenomena of the heavenly bodies. These are the sun, the planets with their moons, the comets, and the fixed stars. The visible heavens afford the most sublime subject of study which can be derived from science, The magnitude and splendour of the objects, the inconceivable rapidity with which they move, and the enormous distances between them, impress the mind with some notion of the energy that maintains them in their motions with a durability to which we can see no limit. Equally conspicuous is the goodness of the great First Cause, in having endowed man with faculties by which he can not only appreciate the magnificence of his works, but trace, with precision, the operation of his laws, use the globe he inhabits as a base wherewith to measure the magnitude and distance of the sun and planets, and make the diameter of the earth's orbit the first step of a scale by which he may ascend to the starry firmament.

All the knowledge man possesses of external objects, is founded on experience, which furnishes facts; the comparison of these facts establishes relations, from which induction (the belief that like causes will produce like effects,) leads to general laws, and by a knowledge and application of these general laws, all the great truths in astronomy are ascertained and established. The peculiar department of this science, by which the nature and effects of these general laws have been investigated, and the connexion traced between this and other branches of knowledge, have been properly termed physical astronomy. But our limits will only permit us as we pass along, cursorily to allude to this connexion; we must in the present chapter confine ourselves chiefly to a summary of the principal facts which have been already established as the result of physical astronomy.

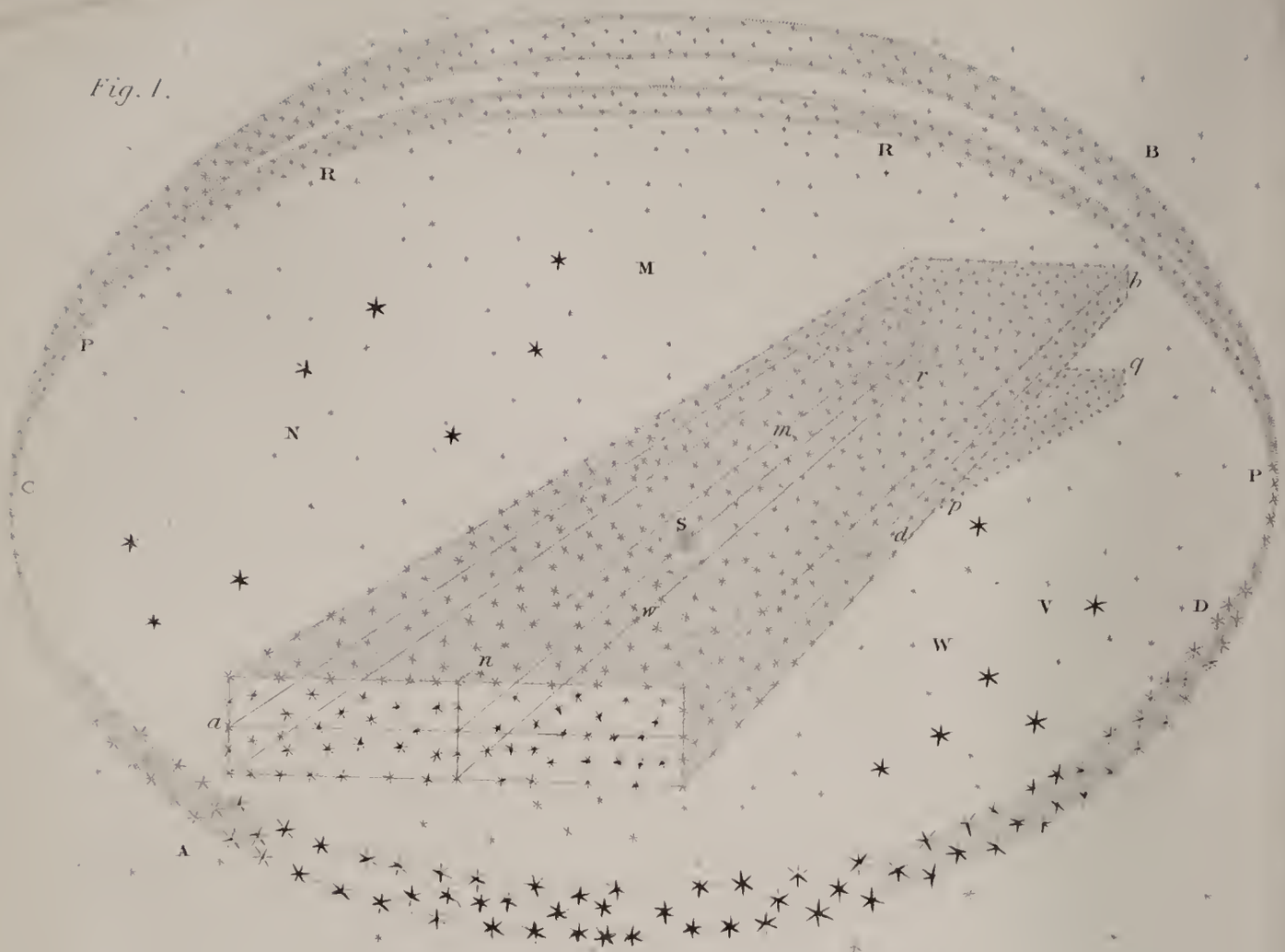
### THE SOLAR SYSTEM.

Although the ancients made very considerable advances in some branches of astronomical science, yet, if we except the discoveries

# ASTRONOMY.

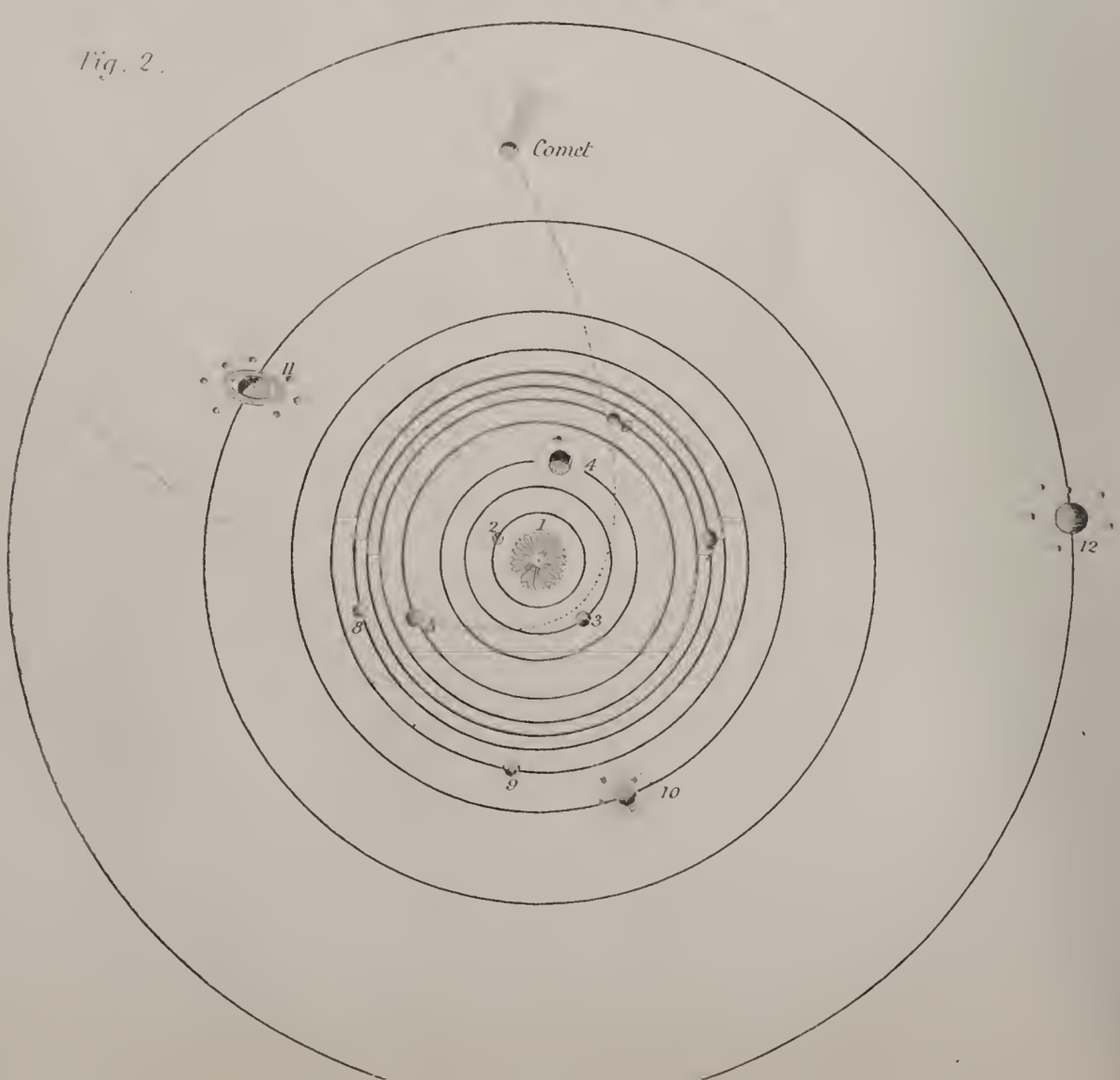
## MILKY WAY.

*Fig. 1.*




## SOLAR SYSTEM.

*Fig. 2.*



of some philosophers of the Pythagorean school, their ideas of the solar system were in general very imperfect and erroneous.

Aided by the great improvements in the telescope, which discover to us many new planets since the time of Copernicus, the solar system now presents to us eleven primary planets, eighteen secondary planets, or moons, and a number of comets. The planetary bodies which revolve round the sun, and not round any other body, are called primary planets; while those which revolve round the primary planets, as our moon, and the moons of Jupiter and Saturn, are termed secondary planets.

The names of the primary planets are Mercury, Venus, the Earth, Mars, Ceres, Pallas, Juno, Vesta, Jupiter, Saturn, and Herschel, or the Georgium Sidus. Of these the four newly discovered planets, Ceres, Pallas, Juno, and Vesta, being much smaller than the rest, are by some astronomers separated from them under the name of *asteroïdes*, or star-like bodies.

The eighteen secondary planets are dependent upon some of the primaries, and move round them as they revolve about the sun. Of these secondaries, or satellites, the Earth has one, which we call the moon; Jupiter has four; Saturn seven, besides a luminous ring which encircles his orb; Herschel has six: but none of these, except our moon, can be seen without the help of a telescope.

The Sun is in the centre; nearest to the sun revolves Mercury, then Venus, the Earth, Mars, Vesta, Juno, Ceres, Pallas, Jupiter, Saturn, and Herschel. See Plate *Astronomy*, fig. 2.

The paths in which the planets move are called their orbits. The orbits of the planets, though circular in the figure, are in nature elliptical. The planets perform their revolutions in different periods of time: the time of performing their revolution is called their year; they turn on their axes, and the time employed for this purpose is called their day. The planets are opaque bodies, and shine only by reflecting the light which they receive from the sun.

Venus and Mercury, being nearer the sun than the earth, are called *inferior* planets; and all the others, which are without the earth's orbit, are called *superior* planets. When a planet is situate so as to be between the sun and the earth, or so that the sun is between the earth and the planet, then the planet is said to be in *conjunction* with the sun; but when the earth is between the sun and any planet, then that planet is said to be in *opposition*. The inferior planets have two conjunctions with the sun, but the superior have only one, because they can never come between the earth and sun. When a planet comes directly between the

earth and sun, it appears to pass over the sun's surface, and this is called the transit of the planet. The planets move faster when they are nearest the sun, and slower in the remotest parts of their orbits.

The SUN (fig. 1) the source of light and heat to the earth and the planets which revolve round him, is a vast sphere, whose diameter is 888,000 miles, or more than a thousand times larger than that of the earth; its magnitude therefore is a million times as great.

Black spots, of an irregular form, are observed at the surface of the sun, which when examined from day to day, are found to traverse the whole surface from east to west in fourteen days. Their number, position, and magnitude, are extremely variable. They are often very numerous, and of considerable extent. Some have been observed whose diameters exceed four or five times that of the earth. Sometimes, however, but rarely, the sun has appeared free from spots for years together. When a spot is first discovered on the eastern limb of the sun it appears like a fine line; its breadth augments as it approaches the middle of the disk; it diminishes as it goes over to the western limb, where it at last disappears.

The nature of the solar body is to us unknown, and will most probably ever remain so; the speculations respecting it are various. The opinion of Laplace is, that the sun is a mass of fire; but this opinion is now generally exploded: by others it is supposed that the sun is a solid opaque body, surrounded by an enormous atmosphere, filled with luminous clouds, occasionally opening and exhibiting the dark mass within, and that the spots are portions of the solid sphere of the sun.

MERCURY (fig. 2) is the planet nearest to the sun, and on that account is very seldom visible. It is not often seen by the naked eye, except in the southern parts of the world. Mercury being within the earth's orbit, its enlightened side is always turned towards the sun, moving round that luminary at the amazing rate of 95,000 miles an hour.

VENUS (fig. 3) is by far the most brilliant of all the planets: sometimes, indeed, it is visible in full day by the naked eye. When this planet is westward of the sun, and therefore rises before him, it is, from the splendour of its appearance, called the morning star; when it is eastward of the sun, and therefore sets after him, it is an evening star.

The EARTH, (fig. 4) like the rest of the planets, has a diurnal motion about its axis, and an annual one about the sun. The diurnal motion of the earth is the cause of day and night. When one half of the earth is turned towards the sun, it receives its rays, and

is illuminated, causing day ; and when this half is turned from the sun, we are in darkness, and then we have night.

Twilight is owing to the refraction of the rays of light by our atmosphere, through which they pass, and which, by bending them, occasion some to arrive at a part of the earth that could not receive any direct rays from the sun.

The axis of the earth, in its journey round the sun, is inclined to the plane or level of its orbit. This inclination of the earth's axis, in its annual motion round the sun, occasions the diversity of the seasons. The lengthening and shortening of the days and the different seasons are produced by the motion of the earth in its orbit round the sun.

The Moon, next to the sun, is the most remarkable object in the heavens. It is a satellite, or secondary planet to the earth, round which it revolves, and by the influence of which it is carried round the sun. The average distance of the moon from the earth is 240,000 miles ; it turns on its axis in the same time as it performs the revolution round the earth, namely, in about $29\frac{1}{2}$ days, thence the moon has always the same side towards the earth. Its diameter is estimated at 2,178 miles.

The moon's year is of the same length as that of the earth, but the number of its days is very different. To the earth there are $365\frac{1}{4}$ days in a year ; to the moon only about $12\frac{1}{2}$.

Viewing the moon with a telescope, several curious phenomena present themselves. Spots are observed, differing very greatly in degrees of brightness ; some are almost dark ; many of them must be hollows dug into the surface, or valleys lying between high mountains, from the nature of the shades of light which they exhibit.

That there are mountains in the moon is made very evident by a number of bright spots which are seen in the dark part of the face, near to the separation of light and darkness. These are rationally supposed to be the tops of eminences, enlightened by the rays of the sun, while their lower parts are in darkness. From observations which may be easily made by any person, it is found that the moon has a motion from west to east. This may be proved by looking at the moon upon any clear evening, and observing its distance from some brilliant star ; the next evening the distance between the moon and star will be considerably altered : if the star be eastward of the moon, the apparent distance between will be first diminished, then the moon will pass by the star, and afterwards the distance will become greater ; but if the star be to the west of the moon, the distance will for many evenings continue to increase. After 27 days, 7 hours, and 43 minutes the moon

and star will be at precisely the same distance as at first. This time is not, however, what we call a month, which is the interval between new moon and new moon, and is 29 days, 12 hours, 42 minutes, nearly. This difference is caused by the motion of the earth in its orbit. Now what is called new moon takes place when the moon is between the earth and the sun, for then its dark part is entirely turned towards us, and full moon is when the earth is between the moon and the sun, and then we see the whole enlightened part.

The rising and setting of the moon is most interesting at or near the full moon. At full moon, as we have seen, it is opposite the sun, and in or nearly the same plane; when the sun is above the horizon, the moon is below, and when the moon is visible, the sun is no longer so.

Hence at midsummer, when its light is least wanted, the moon at full is very little above the horizon. In midwinter at full, when the sun is but a short time visible, the moon being in the opposite side of the plane, remains long above the horizon, and the quantity of moonlight is greatest at a season when its presence is most wanted; and this is more remarkable as we approach the poles; at that region, in midwinter, the moon does not set for fifteen days together.

The moon rises later every day; this is called its retardation; but this varies at different seasons of the year: sometimes the difference is nearly an hour, sometimes only a quarter of an hour, and in the autumn the alteration of the time of rising is the least.

At the autumnal equinox, as we have said before, the moon is in that part of its orbit where the time of its rising, on successive evenings, alters the least; in fact, its daily variation is not more than a few minutes for several days. Now, the full moon being opposite the sun, the moon will rise as the sun sets, that is, about six o'clock in the evening, which is the time of sunset at that season of the year. The next evening it will rise only a few minutes after six, and so on, a little later for several successive evenings. This unusual circumstance happening at a time when the industry of the husbandman is stimulated by the hope of gathering the rich reward of the harvest, the moon, which is at or near the autumnal equinox, is called the harvest moon.

Mars (fig. 5) is not so bright as Venus or Jupiter; its colour is a dusky red hue. The day of Mars exceeds ours by one hour. Mars seems to have an atmosphere, and near its poles shining masses have been seen, which increase or diminish according as they approach or recede from the sun: these have been supposed to be vast icebergs.

The Asteroides.—The four newly discovered planets, revolving between Mars and Jupiter, are of such diminutive size as to bear no proportion to the others. It is, however, fully ascertained that they have all the properties of planets.

*Vesta* (fig. 6) was first seen by Dr. Olbers, of Bremen, on the 29th of March, 1807; it appears like a star of the fifth magnitude.

*Juno* (fig. 7) was discovered by M. Harding, on the 1st of September, 1804; this planet and Ceres, the next in order, appear like stars of the eighth magnitude.

*Ceres* (fig. 8) was discovered on the first day of the present century by M. Piazzi, an Italian astronomer.

*Pallas* (fig. 9) was discovered by Dr. Olbers, on the 28th of March, 1802, and appears like a star of the seventh magnitude.

Jupiter (fig. 10) is the largest planet of our system, its diameter being 88,000 miles, or eleven times greater than the diameter of the earth. It is, next to Venus, the most brilliant of the planets, and sometimes even surpasses it in brightness. Jupiter is attended by four moons, which are frequently eclipsed by the shadow of the planet falling upon them. The eclipses of Jupiter's satellites have been very useful in determining the longitudes of places, and the velocity of light. The first satellite appears to them with a disk four times greater than that of our moon, as it appears to us. In the short space of forty-two hours it goes through all its changes, from new to full, and thence to new again, being itself eclipsed, and causing an eclipse on the surface of Jupiter.

Saturn (fig. 11) can scarcely be seen by the naked eye. When viewed with a telescope, it presents a most singular appearance; the planet is encircled by a broad ring, of a brilliancy always equal to, and sometimes surpassing, that of the planet. The ring, like Saturn, is opaque, for it has been seen like a dark band upon the surface of the planet; hence both derive their light from the sun. The rings and the satellites of Saturn thus reflect the sun's light upon the planet, and Saturn, in his turn, illuminates them. This planet is accompanied by seven moons, one of which, the sixth in distance from him, has been long discovered. The first and second were observed by the indefatigable Sir William Herschel. Both Jupiter and Saturn appear to have atmospheres, and that of the latter seems to be exceedingly dense.

The Georgium Sidus, (fig. 12,) so called by its discoverer in honour of George III. has six satellites, all of which were discovered by Herschel. This planet is frequently called Herschel,

from the name of him who connected it with the solar system; but by foreign astronomers it is almost universally termed Uranus.

It seems to be placed on the confines of the solar system, being at the vast distance 1,800,000,000 miles from the sun; and the period of its revolution, which is eighty-five years, exceeds the ordinary span of human existence.

The following table will give the diameters of the sun and planets; the mean distances of the planets from the sun; and the time occupied in their diurnal and annual revolutions.

| NAMES. | Diameter. | Mean Distance from the Sun. | Rotation upon Axis. | Periodical Revolutions about the Sun. |
|---|---|---|---|---|
| | *Miles.* | *Miles.* | *Days. Hs. Ms. Sec.* | *Days. Hs. Ms.* |
| The Sun ..... | 883,230 | ..... | 25 9 56 0 | ..... |
| Mercury ..... | 3,168 | 36,973,282 | 1 0 5 28 | 87 23 15 |
| Venus ..... | 7,816 | 69,088,240 | 0 23 20 54 | 224 16 49 |
| The Earth .... | 7,964 | 95,513,794 | 0 23 56 4 | 365 5 48 |
| Mars ..... | 4,221 | 145,533,667 | 1 0 39 21 | 686 23 30 |
| Vesta ..... | 238 | 225,435,000 | ..... | 1,335 4 55 |
| Juno ..... | 119 | 253,380,485 | ..... | 1,590 23 57 |
| Ceres ..... | 163 | 262,903,570 | ..... | 1,681 12 56 |
| Pallas ..... | 147 | 262,921,240 | ..... | 1,681 17 1 |
| Jupiter ..... | 90,466 | 494,265,155 | 0 9 55 33 | 4,332 14 39 |
| Saturn ..... | 77,194 | 906,183,000 | 0 10 16 0 | 10,758 23 16 |
| Herschel..... | 34,248 | 1,822,413,975 | 1 18 30 0 | 30,688 17 6 |
| | | Mean Distance from the Earth. | | Periodical Revolutions about the Earth. |
| The Moon ... | 2,178 | 240,911 | 29 12 44 2 | 29 12 44 |

## COMETS.

Comets are luminous bodies moving in eccentric orbits, and undoubtedly forming a part of the solar system. They are not so bright as the planets, but are accompanied by a nebulous (*i. e.* cloudy) appearance, which, increasing, sometimes terminates in a train of considerable length, and of a substance extremely thin, since the stars are seen through it. This appearance, named the tail of the comet, is seen to issue from them in a direction opposite the sun, and increases as the comet approaches that luminary, decreases as the comet departs from the sun, and then gradually disappears.

The appearance of comets, followed by these trains of light, has for a long time terrified mankind, always agitated by extraordinary events of which the causes are unknown. The light of science has dispelled these vain fears; no longer do we look upon the

approach of comets as a herald of war or pestilence. Many of them are found to obey laws similar to those which bind together in a system the planetary bodies: their return has been predicted, and the prediction has been verified; we conclude, therefore, that by these laws the motions of all the comets are regulated. The motions of more than one hundred have been computed, and it has been supposed that there are at least a thousand which range within the earth's orbit.

Comets traverse all parts of the heavens; their paths have every possible inclination to the plane of the ecliptic, and, unlike the planets, the motion of more than half of those that have appeared have been retrograde. They are only visible when near their perihelia, or in that part of their orbit which is nearest the sun. Dr. Halley computed the elements* of the orbit of a comet that appeared in the year 1682, which agreed so nearly with those of the comets of 1607 and 1531, that he concluded it to be the same body returning to the sun, at intervals of about seventy-five years. He consequently predicted its reappearance in the year 1758, or in the beginning of 1759. Science was not sufficiently advanced in the time of Halley (who died in 1742,) to enable him to determine the perturbations, or irregularities of motion, this comet might experience; but Clairaut computed that it would be retarded in its motion a hundred days by the attraction of Saturn, and 518 by that of Jupiter, and consequently that it would pass its perihelium about the middle of April, 1759, requiring 618 days more to arrive at that point than in its preceding revolution. This, however, he considered only to be an approximation, and that it might be thirty days more or less: the return of the comet on the 12th of March, 1759, proved the truth of the prediction. MM. Damoiseau and Pontecoulant predicted that this comet would return in November 1835.

Various other calculations of the period of its return were also made, but these were all set at rest by its actual appearance before the time predicted. By observations made at the observatory at Rome we learn that a comet, answering to the description, was visible there so early as the month of August 1835, and it is well known that it was seen in England in September of the same year, and continued visible for several months. By an observation

* The elements of a comet.—This is a term used by astronomers to describe in degrees the orbit or path of a comet through the heavens with other phenomena. The elements usually consist of, 1. The longitude of its ascending node, or point in which it intersects the plane of the ecliptic: 2. The inclination of the orbit on the plane of the ecliptic: 3 The longitude of the perihelium: 4. The perihelium distance from the sun: 5. The time of the year at which it arrives at the perihelium distance: and 6. The direction of a comet's motion.

made at the observatory at Kensington, we learn that it exhibited an appearance resembling two tails; the one in a line with the other; they lay in the south preceding and north following quadrants, and were inclined to the parallel, at an angle of about 75 degrees. The nucleus was very brilliant, extremely well defined, and bore any lamp illumination whatever. The appearance which the observer designates its second tail was perfectly visible with a five-feet achromatic. This is the first comet whose periodical return has been established; it is also the first whose elements have been determined from observations made in Europe, for although the comets which appeared in the years 240, 439, 565, and 837, are the most ancient whose orbits have been traced, their elements were computed from Chinese observations.

Besides Halley's comet, two others are now proved to form part of our system; that is to say, they return to the sun at intervals, one of 1207 days, and the other of $6\frac{3}{4}$ years, nearly. The first, generally called Encke's comet, or the comet of the short period, was first seen by MM. Messier and Mechain in 1786, again by Miss Herschel in 1795, and its returns in the years 1805 and 1819 were observed by other astronomers, under the impression that all four were different bodies; however, Professor Encke not only proved their identity, but determined the circumstances of the comet's motion. Its reappearance in the years 1825, 1828, and 1832 accorded with the orbit assigned by M. Encke, who thus established the length of its period to be 1207 days, nearly.

The other comet belonging to our system, which returns to its perihelium after a period of $6\frac{3}{4}$ years, has been accelerated in its motion by a whole day during its last revolution, which puts the existence of either beyond a doubt, and forms a strong presumption in corroboration of the undulating theory of light. The comet in question was discovered by M. Biela at Johannisberg on the 27th of February, 1826, and ten days afterwards it was seen by M. Gambert at Marseilles, who computed its parabolic elements, and found that they agreed with those of the comets which had appeared in the years 1789 and 1795, whence he concluded them to be the same body moving in an ellipsis, and accomplishing its revolution in 2460 days.

Though already so well acquainted with the motions of comets, we know nothing of their physical constitution. A vast number, especially of telescopic comets, are only like clouds, or masses of vapour, often without tails. Such were the comets which appeared in the years 1795, 1797, and 1798; but the head commonly consists of a mass of light, like a planet surrounded by a very

transparent atmosphere, the whole, viewed with a telescope, being so diaphanous, that the smallest star may be seen even through the densest part of the nucleus; and in general their masses, when they have any, are so minute that they have no sensible diameter. The tails of comets proceed from the head in two streams of light somewhat like that of the aurora; these in most cases unite at a greater or less distance from the nucleus, and are generally situated in the planes of their orbits; they follow the comets in their descent towards the sun, but precede them in their return with a small degree of curvature, probably owing to the resistance of the ether, but their extent and form must vary in appearance according to the positions of their orbits with regard to the ecliptic. The matter of the tail must be extremely buoyant to precede a body moving with such velocity; indeed the rapidity of its ascent can only be accounted for by the fervent heat of the sun. Immediately after the great comet of 1680 had passed its perihelium, its tail was 20,000,000 leagues in length, and was projected from the comet's head in the short space of two days. In general the light of comets is dull, but some have been brilliant enough to be visible in full day-light, especially the comet of 1744, which was seen without a telescope at one o'clock in the afternoon, while the sun was shining. Whether they shine by their own or by reflected light has never been satisfactorily conjectured till now. M. Arago, however, has with great ingenuity discovered a method of ascertaining this point, from which it may be concluded that comets shine by reflecting the sun's light.

## ECLIPSES.

When any heavenly body is obscured or darkened by the shadow of another falling upon it, it is said to be eclipsed. An eclipse of the moon can only take place by some dark body coming between it and the sun: this dark body is the earth; for eclipses of the moon only take place when it is full, and then the earth lies between the sun and moon. The globe of the earth casts behind it relatively to the sun a shadow of a conical shape, the length of which is three times the distance of the moon from the earth; its breadth, where the moon crosses it, is about double of the lunar diameter; and the direction of the middle of this cone is a line joining the centres of the sun and earth. Now at the full the moon is also in the same direction; it would therefore be eclipsed every month if its orbit were not inclined to that of the earth; but as it is inclined, the moon is sometimes above, sometimes below the shadow, and consequently this phenomenon does

not always happen. If the whole disk is immersed in the shadow, the eclipse is said to be total; and to be partial when only a portion of the disk is obscured.

An eclipse of the sun happens at new moon, for then the moon is between the earth and the sun, and the moon intercepts the rays of light proceeding from the sun, and hinders them from falling upon the earth.

The number of eclipses that can happen in a year is seven, five of the sun and two of the moon, or four of the sun, and three of the moon.

The reason why partial eclipses of the sun take place is that it seldom happens that the sun, earth, and moon, have their centres exactly in the same line; and the infrequency of eclipses is caused by the orbit of the moon not being coincident with that of the earth.

The beginning and end of solar eclipses can be observed with great accuracy, and are sometimes used in determining the longitude of places on the earth's surface.

## TIDES.

That periodical ebbing and flowing of the sea, denominated the tides, was a subject of considerable speculation to the ancient philosophers; but before the Christian era, the theory of the tides was absolutely unknown. During the first and second centuries, however, Pliny, Ptolemy, and others, began to suspect that the phenomena of the tides were influenced by the attraction of the sun and moon; but we are indebted to our illustrious countryman, Sir Isaac Newton, for the general development of the first rational theory of the tides.

It is acknowledged that there are still some difficulties attending this subject, but in general terms it may be stated as follows:—the ebbing and flowing of the sea is owing to the attraction of the sun and moon, and chiefly to that of the latter. This attraction cannot alter the shape of the solid parts of the earth, but it has a great effect on the water, and causes it to assume a spheroidal figure, the longest axis being in the direction of the moon.

To explain this, let us suppose that the whole earth is covered with water; then, if there were no attraction arising from any external body, the water would gird the sphere of the earth, lying upon it like the rind of the orange, but always at the same depth.

But the moon attracts the earth, and by this attraction draws

under her the waters of the earth, so that the waters stand indeed upon a heap under her disk. As the earth revolves round its axis, successive portions of its surface pass under the moon, and these places have successively high water. Six hours after the high tide, the waters are at their lowest ebb, and in six hours more, we have high tide again. When the moon and sun both act in the same direction upon the waters, the tides are the largest; this happens at new and full moon, and the tides are called spring tides; but when they act in contrary directions, the tides are called neap, and are then the lowest; this happens at the end of the first and beginning of the third quarters of the moon.

In the preceding illustration of the cause of the tides, it is assumed that the place of high water is directly under the moon; this, however, is not the case. For although the waters directly under the moon are drawn towards it with greater force than any other part of the ocean, yet the water will not have reached its greatest height at any particular place till some hours after the moon has passed its meridian. For the waters attracted to the moon, when at this particular spot, will, from the impulse given, continue to flow to it, and rise there, until the moon, overcoming this impulse by a new one, shall draw them to some other spot.

## THE FIXED STARS.

The stars, which are called fixed in contradistinction of the planets, are supposed by astronomers to be each of them a sun, shining by its own light, and accompanied by its circle of planets. These stars are separated from each other by distances at least as great as the nearest fixed star is from our sun. They are commonly classed into magnitudes, according to their appearance from our earth; the largest are called stars of the first magnitude, and the others in proportion. Although the stars appear to us so innumerable, this is a deception, occasioned probably by the refraction and reflection of the rays of light passing from them through our atmosphere. There are seldom more than 2,000 stars seen with the naked eye, at any one time; several millions more are, however, occasionally visible by the assistance of the best telescopes, and new ones are continually discovered by every improvement in that instrument.

The ancients, for the convenience of referring to the different stars, divided them into groups, or constellations, to which they gave the names of animals, or of inanimate things, which they were supposed to resemble; as the Great Bear, the Northern Crown, &c.

The constellations are divided into three principal classes; those on the northern side of the equator are called northern constellations, and those on the opposite, southern constellations; while those which are situated about that part of the celestial hemisphere where the principal planets move, are called zodiacal constellations.

The zodiac is an imaginary belt, encircling the heavens, about sixteen or twenty degrees broad. In the centre of this zone, or belt, is the ecliptic, or line which the sun appears to describe, as the earth moves round in its annual circuit. On this line are found the twelve zodiacal constellations, each thirty degrees in breadth, so as to fill up the entire circle of 360 degrees, which the heavens are divided into. They are marked and numbered in the following order:—

| Character. | Name. | | Time of the Sun's ingress. |
|---|---|---|---|
| ♈ | Aries, | the Ram, | About March 21st. |
| ♉ | Taurus, | the Bull, | April 20th. |
| ♊ | Gemini, | the Twins, | May 21st. |
| ♋ | Cancer, | the Crab, | June 21st. |
| ♌ | Leo, | the Lion, | July 23d. |
| ♍ | Virgo, | the Virgin, | August 23d. |
| ♎ | Libra, | the Balance, | September 23d. |
| ♏ | Scorpio, | the Scorpion, | October 23d. |
| ♐ | Sagittarius, | the Archer, | November 22d. |
| ♑ | Capricornus, | the Goat, | December 21st. |
| ♒ | Aquarius, | the Waterman, | January 20th. |
| ♓ | Pisces, | the Fishes, | February 29th. |

The other northern constellations are thirty-four in number; the ancient and principal ones are mentioned in the annexed catalogue:—

| Names. | | Principal Stars. | Magn. |
|---|---|---|---|
| Ursa Major, | the Greater Bear, | Dubhe, | 1 |
| Ursa Minor, | the Lesser Bear, | Pole Star, | 2 |
| Perseus, | | Algenib, | 2 |
| Auriga, | the Waggoner, | Capella, | 1 |
| Bootes, | | Arcturus, | 1 |
| Draco, | the Dragon. | | |
| Triangulum, | the Triangle. | | |
| Corona Borealis, | the Northern Crown. | | |
| Serpens, | the Serpent. | | |
| Hercules, with the Branch. | | | |
| Lyra, | the Harp, | Vega, | 1 |

| Names. | | Principal Stars. | Magn. |
|---|---|---|---|
| Sagitta, | the Arrow. | | |
| Aquila, | the Eagle, | Altair, | 1 |
| Delphinus, | the Dolphin. | | |
| Cygnus, | the Swan, | Deneb Adige, | 1 |
| Cassiopia, | the Lady in her chair. | | |
| Pegasus, | | | |
| Andromeda. | | | |

There are forty-five constellations in the Southern Hemisphere, the principal of which are the following :—

| Names. | | Principal Stars. | Magn. |
|---|---|---|---|
| Eridanus, | the River Po, | Achernar, | 1 |
| Cetus, | the Whale. | | |
| Noah's Dove, | | Betelgense, | 1 |
| Orion, | | Canopus, | 1 |
| Argo Navis, | the Ship Argo. | | |
| Canis Major, | the Greater Dog, | Sirius, | 1 |
| Canis Minor, | the Lesser Dog, | Procyon, | 1 |
| Hydra, | | Cor Hydræ, | 1 |
| Piscis Australis, | or the Southern Fish, | Fomalhaut, | 1 |

It has already been remarked, that about 2000 stars only are visible to the naked eye; but when we view the heavens with a telescope, their number seems to be limited only by the imperfection of the instrument. In one hour Sir William Herschel estimated that 50,000 stars passed through the field of his telescope, in a zone of the heavens 2° in breadth. This, however, was stated as an instance of extraordinary crowding; but at an average, the whole expanse of the heavens must exhibit about a hundred millions of fixed stars, that come within the reach of telescopic vision.

The stars are scattered very irregularly over the firmament. In some places they are crowded together, in others thinly dispersed. A few groups more closely condensed, form very beautiful objects, even to the naked eye; but the greater number of these clusters of stars appear to unassisted vision like thin white clouds or vapours: such is the Milky Way, which, as Sir William Herschel has proved, derives its brightness from the diffused light of the myriads of stars that form it. This singular portion of the heavens, constituting part of our firmament, consists of an extensive stratum of stars, whose thickness is small compared with its length and breadth: the earth is placed about midway between its two surfaces, near the point where it diverges

into two branches. Many clusters of stars appear like white clouds, or round comets without tails, either to unassisted vision or with ordinary telescopes; but with powerful instruments Sir John Herschel describes them as conveying the idea of a globular space, filled full of stars insulated in the heavens, and constituting a family, or society, apart from the rest, subject only to its own internal laws. To attempt to count the stars in one of these globular clusters, he says, would be a vain task; that they are not to be reckoned by hundreds; and, on a rough computation, it appears that many clusters of this description must contain ten or twenty thousand stars, compacted and wedged together in a round space, whose area is not more than a tenth part of that covered by the moon.

"It is very probable," says Sir William Herschel, "that the great stratum called the Milky Way, is that in which the sun is placed, though, perhaps, not in the very centre of its thickness. We gather this from the appearance of the galaxy, which seems to encompass the whole heavens, as it constantly must do if the sun was in the same. For, suppose a number of stars arranged between two parallel planes, indefinitely extended every way, but at a considerable distance from each other, and calling this a siderial stratum, an eye placed somewhere within it will see all the stars, in the direction of the planes of stratum, projected into a great circle, which will appear lucid on account of the accumulation of the stars; while the rest of the heavens, at the sides, will only seem to be scattered over with constellations more or less crowded, according to the distance of the planes, or number of stars contained in the thickness or sides of the stratum."

After a long investigation of the form of this stratum, Sir William Herschel was enabled to give a figure of what he conceived to be a section of it. This is represented in Plate *Astronomy*, fig. 1. If the celestial globe be adjusted to 55° and $\sigma$, Ceti, be brought to the meridian, it will have the plane of this section pointed out by the horizon. The most distant star is supposed to be about 500 times farther from the sun than Sirius. Light would take 20,000 years to traverse the whole extent.

To conclude in the emphatic language of Mrs. Somerville,—"So numerous are the objects which meet our view in the heavens, that we cannot imagine a space where some light would not strike the eye; innumerable stars, thousands of double and multiple systems, cluster in one blaze with their tens of thousands of stars, and the nebulæ amazing us by the strangeness of their

forms and the incomprehensibility of their nature, till at last, from the imperfection of our senses, even these thin and airy phantoms vanish in the distance. If such remote bodies shine by reflected light, we should be unconscious of their existence; each star must then be a sun, and may be supposed to have its system of planets, satellites, and comets, like our own; and, for aught we know, myriads of bodies may be wandering in space unseen by us, of whose nature we can form no idea, and still less of the part they perform in the economy of the universe. Nor is this an unwarranted presumption; many such do come within the sphere of the earth's attraction, are ignited by the velocity with which they pass through the atmosphere, and are precipitated with great violence on the earth. The fall of meteoric stones is much more frequent than is generally believed—hardly a year passes without some instances occurring; and if it be considered that only a small part of the earth is inhabited, it may be presumed that numbers fall in the ocean or on the uninhabited part of the land, unseen by man. They are sometimes of great magnitude; the volume of several has exceeded that of the planet Ceres, which is about seventy miles in diameter. One which passed within twenty-five miles of us was estimated to weigh about 600,000 tons, and to move with a velocity of about twenty miles in a second: a fragment of it alone reached the earth. The obliquity of the descent of meteorites, the peculiar substances they are composed of, and the explosion accompanying their fall, show that they are foreign to our system. It has been computed that, if a stone were projected from the moon in a vertical line with an initial velocity of 10,992 feet in a second, more than four times the velocity of a ball when first discharged from a cannon, instead of falling back to the moon by the attraction of gravity, it would come within the sphere of the earth's attraction, and revolve about it like a satellite. These bodies, impelled either by the direction of the primitive impulse or by the disturbing action of the sun, might ultimately penetrate the earth's atmosphere, and arrive at its surface. But from whatever source meteoric stones may come, it seems highly probable that they have a common origin, from the uniformity, we may almost say identity, of their chemical composition."—*Connexion of the Physical Sciences*, p.

# CHAPTER XI.

## NATURAL PHILOSOPHY.

NATURAL PHILOSOPHY, also called Physics, is that science which investigates the powers of nature, the properties of natural bodies, and their actions upon each other. Lord Bacon terms natural philosophy, the great mother of the sciences; for neither the arts of speech, logic, medicine, civil polity, morality, religion, &c., can be advantageously instituted, exercised, improved, or understood, without it; and on it the mechanical sciences entirely depend. By means of natural philosophy we learn, "that the creation is but an image or picture of the Divine Perfection, and therefore bears a character of his infinity and immensity who formed and governs it; that this small part of it which we inhabit, is but a point in comparison of the vast regions of the fixed stars; that these superior regions themselves are but a point in comparison of the innumerable worlds that perhaps exist, and lie hid from us in the bosom of immensity; and that in this point which we inhabit, we know only some superficial qualities and properties of nature."

The object of natural philosophy is the study of the general properties of unorganized bodies, or inert substances, in the state of solids, liquids, airs, or gases, and those which have been termed incoercible or ethereal fluids. The various effects of the motions and operations of these bodies have hence been made the foundation of several distinct sciences, or branches of knowledge, as Mechanics, Hydrostatics, Hydraulics, Pneumatics, Acoustics, Optics, Electricity, Galvinism, Magnetism, including Electro-Magnetism, &c.

### SECTION I.—MECHANICS.

MECHANICS (from the Greek word Μηχανὴ, signifying a machine) is that science which treats of the equilibrium and motion of bodies.

All motions are more or less subject to the laws of mechanics, and without a knowledge of those laws, it is impossible to appre-

ciate the effects, or calculate the consequences, of those motions of the celestial bodies which occasion the phenomena of Astronomy; or of those properties of fluids on which depend the principles of hydrostatics, hydraulics, and pneumatics; or, indeed, of any circumstances affecting the ponderable forms of matter; and those sciences which relate to heat, light, electro-magnetism, vital power, either in animals or vegetables, or any other phenomena which appear to be independent of the force of gravitation, yet derive most important aid from mechanics; for it is chiefly by means of mechanical instruments that the influence of heat, light, electricity, magnetism, or the effects of vitality, can be estimated. Mechanics may therefore be considered as the basis and groundwork of the other physical sciences. The properties of matter on which the leading principles of mechanics are founded, are those of mobility and gravitation.

Mobility is the capacity of a body for change of place by its own motion; it therefore infers the capability of real or actual motion, and not of relative motion only. Yet this change of place may sometimes be most readily estimated by the consequent relative motion which accompanies it. Thus, every well-informed person now admits that the earth moves, and the sun stands still; but the motion of the former is not perceptible, and the apparent daily motion of the latter, being so obvious to our senses, was, till within the last three centuries, considered as a real motion, the existence of which could not even be questioned with impunity.

The primary laws of motion, as developed by Aristotle, and taught by Galileo, Descartes, and Newton, are as follows:—

1. Every body continues in a state of rest, or of uniform rectilineal motion, until disturbed by some extraneous force. Thus, a stone remains in its place till moved, or is carried round in a sling or the hand; and a leaf or feather are at rest till impelled by the force of wind.

2. The change of motion is always proportional to the impelling force, and the line of direction of that force.—Consequently, there can be no motion, or power, but what is derived from other motions.

3. Action and reaction are always equal and contrary. If a man in a boat shove off another boat that comes near to him, his own boat is equally moved from its place. If a man in a boat pull a rope fastened to something on shore, he is drawn to it by the reaction. So when a man pushes off a boat from the shore, it is occasioned by the same cause. The quantity of motion by a body gained, equals that lost by the body, whatever the direction, and whether both bodies act from communicated impulse or

collision, or from some undetermined agency without touching. A boat moved with four oars goes twice as quick as with two. A cricket ball, struck with greater force, flies farther in the direction of the impulse.

GRAVITATION, or gravity, is a species of attraction, and is sometimes styled gravitative attraction; by which appellation it is distinguished from cohesive attraction, capillary attraction, magnetic attraction, &c. Most of these kinds of attraction are perceived only under particular circumstances; but the attraction of gravitation is a common property of all bodies, since every body is more or less affected by it. It is by no means inconsistent with this statement that some bodies in certain circumstances display the contrary phenomenon of ascending from it. Thus smoke will be seen, in some states of the atmosphere, rising in a column to a considerable height; and it must be readily conceived that all the moisture which falls to the earth in the form of rain, snow, or hail, must have previously risen by evaporation from the surface of the earth. But all these and similar phenomena are in fact so many instances of the effect of gravitation, for the ascending bodies are driven upward solely by the force of the medium through which they pass; since the particles of smoke or vapour, or the balloon with its car and contents, cannot advance upward in the most minute degree without displacing, or thrusting downward, portions of atmosphere equal to their own bulk. All substances, then, gravitate towards the earth; that is, they have weight, which occasions them to fall to the earth when dropped from a height above it; to rest upon it with a certain degree of pressure, according to circumstances; or, if rendered buoyant, to rise in the atmosphere surrounding the earth, till they reach a part of it where it is less dense than near the surface, so that a portion of it, precisely equal to their bulk, would exactly counterpoise them, and there of course they could neither rise nor fall, without an alteration of their own weight taking place.

The influence of gravitation is not only extended to all bodies on or near the surface of the earth, but likewise, as we have the utmost reason to believe, to all bodies in the universe. Sir Isaac Newton discovered gravity to be the cause of all the motions of the heavenly bodies; and that the laws of gravitation displayed in the monthly revolution of the moon round the earth, the annual circuit of the earth round the sun, and the corresponding motions of the other planets and their satellites, are capable of the strictest mathematical demonstration.

## THE MECHANIC POWERS.

This term is usually applied to engines composed on the principles of the laws of mechanics, increasing the effect of a given power, so that its momentum exceeds that of the resistance; enabling men to raise heavy weights, move heavy bodies, and overcome resistance. It may be proper here to caution the young reader against confounding the terms mechanic power and moving power. Mechanic powers are machines which facilitate motion, as the lever and the screw, while moving powers are the original sources of motion, as animal strength, flowing water, &c. The principal moving powers are the strength of animals, chiefly of men and horses; the force of running waters, and of wind; steam; metallic springs; the weight of heavy bodies, &c.

The mechanic powers may perhaps be most correctly arranged under three divisions: 1. The Lever; 2. The Multiplied Cord; 3. The Inclined Plane. To these some have added the Wheel and Axle, the Pulley, the Wedge, and the Screw. But the wheel and axle is only a variety of the lever. The pulley, so far as it possesses any distinguishing property, must be considered as a multiplied cord. The wedge is nothing but a double inclined plane, applied in a peculiar manner. The screw is a modification of the inclined plane, usually operating through the assistance of a lever.

A Lever, theoretically considered, must be an inflexible rod, of uniform weight in every part, turning freely on a fixed point or fulcrum. There are three kinds or orders of levers, distinguished by the relative positions of the fulcrum and the moving power. In all kinds of continuous levers the power is to the resistance, as the distance of the resistance from the fulcrum is to that of the power from the fulcrum. A lever of the first kind has the fulcrum placed between the weight and the moving power.

A balance is a lever of the first kind with equal arms; a steel yard is also a lever of the same kind with a movable weight.

The second kind of lever has the weight between the fulcrum at one end, and the power at the other.

A lever of the third kind has the power between the prop at one end, and the weight at the other. Here the power must as much exceed the weight, as the distance of the weight from the prop exceeds the distance of the power.

The wheel and axle, though made in many forms, always consists of a cylinder and a wheel attached; or of a cylinder, with projecting spokes.

The wheel and axle is merely a lever, contrived to have continued motion round its fulcrum. If the power acts at the end

of the bar in the extremity of the wheel, the distance of that extremity from the centre is accounted the radius. The crank belongs to this power.

The wheel and axle are employed for large bells, also to move the helm of large ships; and, in some instances, to draw water from deep wells. Numerous combinations may be observed in spinning manufactories, &c.

One of the most efficient forms of the wheel and axle is displayed in the capstan, used on board ships and dock-yards. See Plate 1, *Nat. Phil.* fig. 1.

Another modification of the wheel and axle is the tread-wheel, (fig. 2,) in which the weight of several persons stepping constantly at the circumference of a long wheel, make it revolve by their weight.

The Multiplied Cord.—To this kind of mechanic power may be referred all those cases in which force is transmitted by means of flexible cords or chains, from one point to another.

The pulley is a small wheel turning on an axle, with a small rope passing over it. The small wheel is called a sheeve, and is movable round a pin passing through the centre of a block. This is rather a compound than a simple machine; for, from the investigation of its nature and properties, it will be evident that it is merely a combination of the wheel and axle with the multiplied cord.

Pulleys are either fixed or movable. The fixed pulley gives no mechanical advantage, but merely changes the direction of the power. By it a man, without moving from his place, may raise a weight to any height, as a stone to the top of a building; otherwise he must ascend with the weight.

The Inclined Plane is the least complicated of all the simple machines. It is, as the name implies, a plane surface, supposed to be perfectly smooth and unyielding, inclined obliquely to an horizontal plane; and its effect, as commonly used, is to diminish resistance, and thus enable a moderate power to sustain or overbalance a great weight.

The wedge may be considered as two equally inclined planes united at their bases. The advantage gained is in proportion as the length of the two sides of the wedge is greater than the back, or, as the length of one side is greater than half the back.

The screw, though commonly reckoned among the mechanic powers or simple machines, cannot be considered as such when applied to any practical purpose, as it would be found almost wholly ineffective without the assistance of the lever, which is therefore usually combined with it, and thus it becomes a most powerful machine, applicable to a variety of important purposes.

# NATURAL PHILOSOPHY.



Fig. 1.

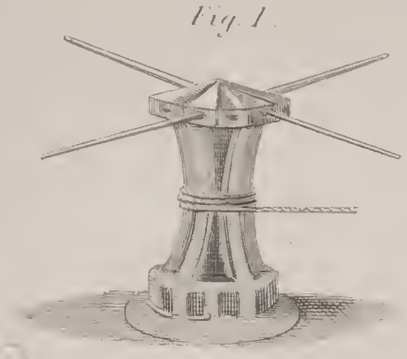


Fig. 2.



Fig. 4.




Fig. 3.

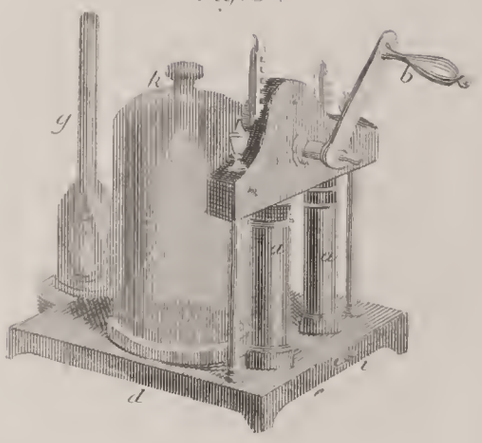



Fig. 5.

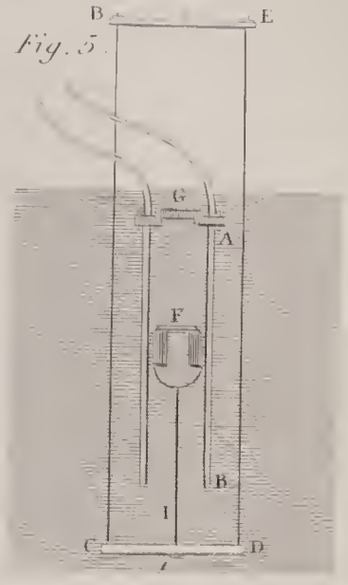





Fig. 6.

Fig. 8.

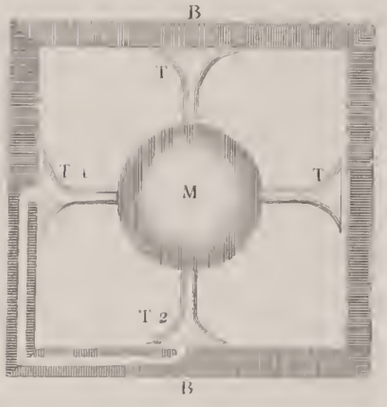



Fig. 7.

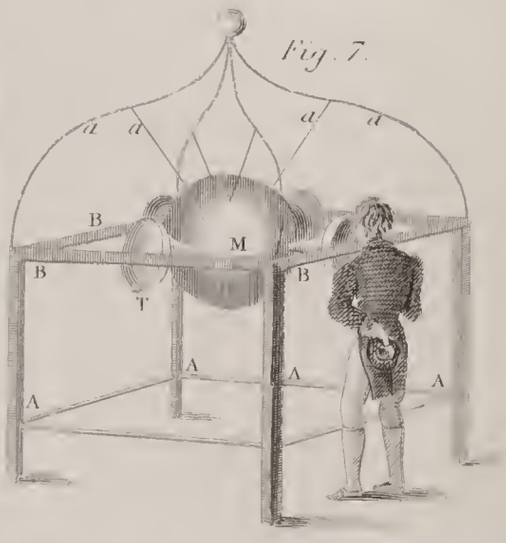
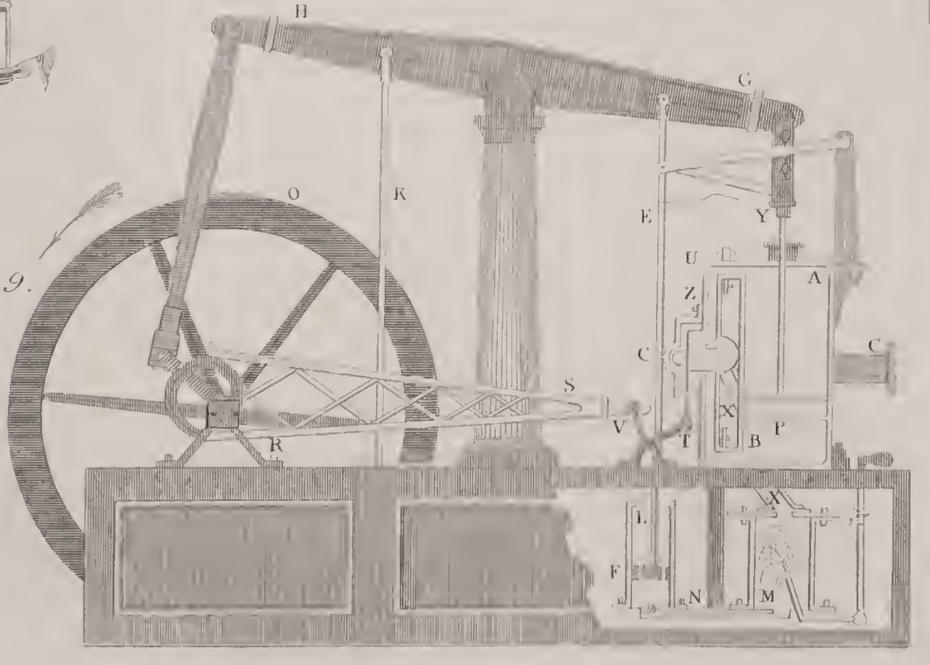



Fig. 9.



The screw is a spiral groove or thread winding round a cylinder so as to cut all the lines drawn on its surface parallel to the axis at the same angle. The spiral may be on either the concave or convex surface, and be thence called interior or exterior, female or male. Most kinds of presses, common corkscrews, &c. act upon this principle. When a screw turns in a wheel, it is called an endless screw; forming a part of a compound machine of considerable power and utility. Fly-wheels, as that of a common jack for roasting meat, are sometimes turned by the action of a toothed wheel on an endless screw.

Compound Machinery.—It is by means of combinations of the simple machines together, or with each other, that a vast multitude of complex machines are produced, which are employed in the arts, manufactures, and domestic economy. Among all the simple machines there is none so generally useful as the wheel and axle; hence there are few complex machines of which wheels do not constitute the most effective or essential parts. Thus are formed a vast variety of mills, from the coffee-mill to the powerful and complicated engine called a rolling-mill; all the multifarious kinds of wheel-carriages, spinning-jennies, and many other machines used in the cotton, linen, woollen, and silk manufactures; and steam-engines under their various modifications. The peculiar methods in which the parts of machinery are connected, or the modes of action of one mechanic power upon another, or upon a different form of the same power, are variously diversified to suit particular purposes. But this embraces a field of operation too large to form the subject of our present inquiry.

## Section II.—Hydrostatics.

The term Hydrostatics properly denotes the stability of water; or, in a more extensive acceptation, the pressure and equilibrium of liquids at rest. As the science of mechanics treats of the properties of weight and mobility in solid bodies, so hydrostatics relates to the peculiar effects of the weight and mobility of liquids These differ in some of their distinguishing properties from solids, and in others from gases, or aerial fluids; forming an intermediate class of bodies. Viscous fluids, as train-oil or treacle, approach to the nature of solids; and, indeed, the distinction between such liquid substances and some of the softer solids, as butter or honey, depends much on their relation to heat, their consistence or relative density varying with the temperature to which they are exposed. The peculiar degrees of density and tenacity of unorganized substances constituting the respective states of solidity

and fluidity, with their various modifications, seem to be chiefly influenced by heat and pressure; so that a particular substance, as water, may exist under different forms, depending on the circumstances in which it is placed. Thus a certain degree of cold will convert water into a hard solid, as ice, or hail, which when melted by heat again produces water, and this, when exposed to a sufficiently high temperature, will evaporate or become steam, which may be again condensed or restored to the liquid state by cold. Mercury commonly occurs in the form of a very dense liquid, but it may, like water, be condensed or frozen by exposure to an extremely low temperature, and be made to boil or evaporate by subjecting it to a great degree of heat. Since then the same kind of matter may exist under different states or forms, it follows that liquids must be composed of the same particles as solids, and the difference between a liquid and a solid may be conceived to arise merely from peculiar modifications of the cohesive attraction which takes place between the constituent molecules or particles of such bodies respectively. The cohesive attraction between the particles of liquids is demonstrated by the globular figure which they assume, when no external force interferes with the aggression of the mass. This appears in the case of mercury thrown in small portions on a china plate, or on any surface which exercises on it no chemical attraction; when the minute portions into which it will become separated will be found to be perfect spherules, the larger ones only being slightly flattened by the pressure occasioned by their own weight on the plate.

That liquids as well as solids possess weight was never denied; since every one must have learnt from experience, that a cup or a bucket filled with water would require a greater exertion of force to lift it than when the water was removed. The apparent diminution of the weight of bodies under water, is owing to the particles of the liquid mass gravitating equally in every direction; so that the interior portions of any liquid, or of solids immersed in liquids, are subject to the same degree of pressure on all sides; and therefore a body surrounded by water is partially supported by it, and consequently may be raised through the liquid with greater ease than in the air, a fluid the relative density of which is so very inconsiderable. Liquids are not less powerfully affected by gravitative attraction than solids, but they exhibit different appearances under its influence, owing to their being constituted differently, so that their particles move freely and almost independently of each other. All the constituent particles of a solid are firmly connected, and they thus act with combined effect in producing pressure or impact; but a liquid yields to force in any direction, and is liable to

be separated into small masses, the effect of which is comparatively inconsiderable.

Liquids press not only like solids perpendicularly downwards, but also upwards, sideways, and in every direction. A fluid in an open vessel assumes a flat surface, parallel to the horizon, and will remain at rest, or rise to a common level.

The horizontal bottom of a vessel sustains the pressure of a column of the fluid whose base is that bottom, and the perpendicular height, the depth of the fluid. The pressure of a fluid upon any given part of the bottom or sides of the vessel, is equal to the weight of a column of that fluid, having a base equal to that part of the bottom or side, and an altitude equal to the perpendicular height.

The pressure of fluids differs from their gravity or weight, the weight agreeing with the quantity, but the pressure with the perpendicular height.

The effect of the vertical pressure of liquids may be variously exhibited. Hence the principle involving the peculiar mode of pressure of liquid masses has been termed the Hydrostatic Paradox. It may be illustrated by the following experiment. Let a cup or wide-mouthed jar, filled with water, be poised by hanging it to the arm of a balance, and loading the opposite scale with the requisite weights; then, after marking exactly the height at which the liquid stands, pour out a part of it, and plunge into the midst of the jar a conical block of wood, supporting it with the hand or any other means, taking care that the block shall not touch the sides or bottom of the jar. If it be plunged just deep enough to raise the remaining liquid to the same height as at first, the balance will be again exactly equipoised; and the block may be so large as to leave only a thin film or hollow cylinder of the fluid without at all disturbing the equilibrium. It is of no consequence what is the weight or shape of the body introduced, for a piece of cork or a blown bladder held in the jar will produce the same effect, if its bulk be sufficient to raise the water to the required height.

The uniform pressure of liquids in every direction, causes them to assume a level surface under all circumstances. This property of liquids has been advantageously employed in the construction of instruments for ascertaining the relative heights of any given points, as in taking levels in surveying, and in various operations in which it is requisite to determine the accuracy of an horizontal plane. By means of this principle water may be conveyed in pipes or tunnels from a lake or reservoir underneath streets and buildings to any given distance, and supplied to the different

quarters of a city or town, at any height not exceeding that of its source.

By the specific gravity of bodies is understood the relative weight of equal bulks of different bodies. A cubic foot of cork is not of equal weight with a cubic foot of water, marble, or lead; but the water is four times heavier than the cork, the marble eleven times, and the lead forty-five times; or, a cubic foot of lead would weigh forty-five of cork, &c. &c. When two or more liquids, differing from each other in specific gravity, are placed in contact, as when included in a glass jar or bottle, unless they are capable of uniting to form a chemical compound, it will be perceived that each liquid becomes arranged in a separate and distinct stratum, the heaviest, or that which has the greatest specific gravity, sinking to the bottom of the jar, the next heaviest above it, and the others, in the same manner, taking their places according to their respective degrees of specific gravity. Thus, mercury, water, olive-oil, and sulphuric ether, might be poured into the same phial, in which they would form separate layers, standing one above another in the order in which they have been mentioned. Many liquids, differing in specific gravity, may be mixed by agitation, so as to form a compound; but if the lighter liquid be poured gently on the surface of the heavier, they will for a long time remain distinct, but little action taking place even where their surfaces meet. Bodies, differing in specific gravity, and incapable of combination, may be taken together in a phial, and mixed for a time, but will separate completely on being allowed to remain at rest.

In comparing the relative or specific gravities of bodies, it is necessary that there should be some standard to which the respective weights may be referred. The extraordinary power of water to resist compression by mere mechanic force, except under such circumstances as can rarely take place, is one of the advantages it presents as a common standard; but in the prosecution of experiments of a delicate nature, the pressure of the atmosphere must be taken into the account in order to ensure accuracy in the results of our calculations. Now it is a well ascertained fact that water attains the utmost degree of density just before it freezes, its bulk being relatively less at about 40° of Fahrenheit, or 8° above the freezing point, than at any point either higher or lower in the scale. The difference of the weight of a cubic inch of distilled water at 40° and at 60° is somewhat less than half a grain troy, whence it may be made to appear from calculation that a cubic foot of pure water, at its greatest density, weighs almost exactly 1000 ounces avoirdupois, or 62½ pounds. If, therefore, the specific gravity of water be represented by the number 1000, each of the numbers

in the following table will express the corresponding weights of a cubic foot of the several bodies included in it.

Specific gravities of various bodies as compared with water at 60°.

| | |
|---|---|
| Platina, laminated | 22,069 |
| Gold, standard, 22 carats | 17,486 |
| Mercury, fluid | 13,568 |
| Lead, cast | 11,352 |
| Silver, cast | 10,474 |
| Copper, cast | 8,788 |
| Iron, malleable | 7,788 |
| Tin, cast | 7,291 |
| Zinc, cast | 7,190 |
| Diamond | 3,521 |
| Parian marble, white | 2,837 |
| Flint | 2,596 |
| Coal | 1,270 |
| Sea water | 1,030 |
| Ice | 930 |
| Alcohol | 797 |
| Olive oil | 915 |
| Milk, cow's | 1,032 |
| Mahogany | 1,062 |
| Heart of oak, sixty yards felled | 1,170 |
| Cork | 240 |
| Carbonic acid, or fixed air | 1.64 |
| Oxygen gas | 1.34 |
| Azotic, or nitrogen gas | 0.98 |
| Hydrogen gas | 0.08 |
| Atmospheric air | 1.21 |

Capillary Attraction.—This phenomenon, which takes place in tubes open at both ends, or between solid plates nearly in contact, is styled capillary attraction; the term is derived from *capillus*, a hair, or *capilaris*, hair-like, in reference to the small bore of tubes which produce these effects. Instances of the operation of this principle are constantly taking place around us. If a slice of stale bread an inch square, and three or four in length, be held perpendicularly with one end immersed in a small quantity of water or milk, the liquid will ascend through the pores of the bread till it is entirely absorbed, and if there is a sufficient quantity of it, the bread will become saturated with the moisture. It is in consequence of the capillary attraction that a sponge imbibes water, blotting paper absorbs ink, or that oil rises amidst the fibres of the cotton wick of a lamp. These effects are manifestly

owing to a common cause, and we learn from experiment that it is only under certain conditions that they take place. Some remarks have been introduced relative to the effect of cohesive attraction on the particles of liquids, and the modifications produced by the attraction of solids with which the liquids may come in contact. It is on the joint operation of these causes under particular circumstances that the phenomena of capillarity appear to depend.

## Section III.—Hydraulics.

Hydraulics teaches how to estimate the velocity and force of fluids in motion. On its principles are constructed all machines worked by water, as engines, mills, pumps, fountains, &c.

Fluids may be conveyed over hills and valleys in bended pipes, to any height not greater than the level of the spring from whence they flow. Upon this principle fountains are formed: for if near the bottom of any vessel a small pipe bending upwards be fastened, the water will spout out through the pipe, and rise nearly as high as the surface of the water in the vessel.

Hydraulic Machines.—The objects of hydraulic machinery are chiefly those of raising water from a lower to a higher level, or employing its impulse as a moving power; which effects may be produced by hydrostatic pressure or impact, on liquids and solids, either alone or in conjunction with atmospheric pressure. The construction of those machines, whose operation depends on the latter cause, must be referred to Pneumatics; but there are other machines which may be properly noticed under this head, as their modes of action admit of satisfactory explanation on the principles of hydrostatic science. These are of three kinds: machines for raising water by mechanical means only; those which act by the weight, pressure, or impact of water, on solids; and those in which the effect is produced by the centrifugal force or intermitting action of flowing water.

Of the first kind, is the common Draw Well, from which the water is lifted by means of a bucket and windlass; but this raises a comparatively small quantity of water. The Chain Pump is a much more efficient engine, though very similar in its mode of action to the preceding. The Persian Wheel, which is used to raise water in Persia, and other eastern countries, consists of a large wheel, to the nave of which are suspended a number of buckets, in such a manner that in the revolutions of the wheel they successively dip into a pond or stream of water, over which the wheel moves, and the buckets thus filled ascend with their

load till each in turn reaches the summit of the circuit. The Screw of Archimedes derives its designation from a prevalent opinion, that it was the invention of the Syracusan sage. It consists of a flexible tube like a hollow corkscrew, wound round a solid cylinder, which may be made to revolve by turning a winch, or by attached wheel-work.

To the second class, belong all the different modifications of water-wheels respectively termed Undershot Wheels, Overshot Wheels, and Breast Wheels.

The Undershot Wheel consists of a wheel on the periphery of which are fixed a number of flat boards at equal distances, and set at right angles to the plane of the wheel. They are called float-boards; and the wheel being so placed as for its lowest point to be immersed in flowing water, it is set in motion by the impact of the water on the boards, as they successively dip into it. The Overshot Wheel differs from the foregoing, in the manner in which it is acted on by water, receiving its impulse not from the impact alone, but also from the weight of water. This kind of wheel can only be used where a considerable fall of water can be obtained. On its periphery are fixed a number of cavities called buckets, being closed on both sides, but having openings, so that the water conducted by a level trough of the same breadth with the wheel, may fill each bucket in succession, as it reaches that point in the circuit of the wheel at which the weight of the water can begin to act on its circumference.

Among the hydraulic machines belonging to the third class, which derive their power from the centrifugal force of flowing water, may be included the Hydraulic Ram. It operates chiefly from the momentum of a current of water, suddenly stopped in its course, and made to act in another direction; and as it produces a kind of intermitting motion, owing to the alternate retreat and access of the stream, accompanied with a noise arising from the shock, its action has been compared to the butting of rams: and hence the name of the machine. This machine, which has undergone many improvements, may be applied to work machinery for various purposes.

## Section IV.—Pneumatics.

Pneumatics explains and illustrates the phenomena which arise from the weight, pressure, or motion of atmospheric or common air, or other fluids possessing the same general properties. There are two kinds of aeriform bodies; namely, those which are always in the gaseous state under common circumstances of temperature

and pressure, thence named permanent gases or airs; and those which become gases chiefly at high temperatures, and which therefore may be styled non-permanent gases or vapours. It will therefore be conducive to perspicuity to notice the properties of the permanent gases only, such as atmospheric air, under the head Pneumatics, and the non-permanent gases, especially steam or the vapour of water, under Pyronomics, or the doctrine of Heat.

Common air is an invisible or perfectly transparent fluid, surrounding the earth, and extending a considerable height above it. The air, with the clouds and vapours that float in it, is called the atmosphere. All bodies on the surface of the earth, sustain a pressure from the superincumbent atmosphere equal to the weight of a column of water, about thirty-two feet in height, with a base corresponding in extent to that of the body or bodies pressing upon. This pressure may be estimated at about fourteen or fifteen pounds on every square inch of surface, being the weight of a column of mercury thirty inches high, and one inch square at the base.

Common, or atmospheric air, was long supposed to be a simple elementary body, and it was imagined that all elastic fluids were essentially the same. It is now known that atmospheric air is a compound, consisting almost entirely of two different species of air or gas; one of which, called oxygen gas, and sometimes vital air, is necessary to the support of animal life; and the other, named nitrogen or azotic gas, when inspired alone, is injurious to animals. They are usually in about the following proportions:—

| | |
|---|---|
| Oxygen . . . . . | 21.5 |
| Azote . . . . . | 77 0 |
| Aqueous vapours . . . . . | 1.5 |
| | 100.0 |

Atmospheric, or common air, is 800 times lighter than water, and like other fluids, the whole atmosphere presses on all sides whatever is immersed in it, and in proportion to the depths. It has an elastic or expansive nature, the force of its elasticity being equal to its weight; this elasticity operates in all directions, and is as powerful in small as large bulks.

This property of the air is most convincingly demonstrated by the operation of the machine called an air-pump. By adapting two stop-cocks to a common syringe, and forming by means of them a communication with a vessel of a convenient shape and dimensions, a rude and imperfect kind of air-pump might be contrived, by means of which air included in the vessel might be considerably rarified or condensed. An air-pump, indeed, essen

tially consists of two exhausting syringes, so arranged that they can be worked alternately. A multitude of interesting experiments, serving to demonstrate the various properties of air, may be satisfactorily performed by means of this machine.

Plate *Nat. Phil.* fig. 3, represents one of the most convenient air-pumps. A A are two barrels, each having a piston with a valve opening upwards. The pistons are worked up and down alternately by the winch *b*. On the wooden frame *d e* are two plates, ground perfectly flat, and also a tube communicating with the two cylinders, the cock *i*, and opening in the centre of the plates at *a*. The smaller plate is for the gauge; *k* is the glass receiver (whence the air is to be exhausted) made to fit particularly close on the plate, with a wet piece of leather laid between them. Having shut the cock *i*, the pistons are worked, and draw the air from the glass receiver through the pipe; when the piston is forced down, the air rises through the valve upwards, but it is prevented returning. The air being gradually exhausted, the receiver becomes immovably fixed by the pressure of the surrounding atmosphere. On opening the cock *i*, the air rushes audibly and violently into the receiver.

By experiments with this instrument the following important properties of air are demonstrated.

1. The air has weight. Exhaust the air from the glass receiver; it will be held down by the pressure of the external air. Cover the orifice of an open receiver with a piece of bladder; on exhausting the receiver, the bladder will burst with a loud explosion.

2. Air presses equally in all directions. Fill a glass vessel with water, and cover it with a piece of paper; on inverting the glass, the water is kept from falling by the upward pressure of the air.

3. The air is elastic, or capable of compression and expansion. A blown bladder, pressed with the hand, resumes the form it had before the pressure.

4. The elastic spring of the air is equivalent to the compressing forces. Exhaust an open tube, whose lower part is inserted in a vessel containing mercury, and the air within the vessel being prevented from escaping, will, by its elasticity, force the mercury up the tube almost the height it would be raised by atmospheric pressure.

5. The elasticity of air is increased by heat. To the bottom of a hollow glass ball affix an open bended tube. Fill the lower part of the tube and part of the ball with mercury: the external surface is pressed by the weight of the atmosphere equally, as the internal surface is pressed by the spring of the air in the ball. Place the ball in boiling water, and the increased elasticity of the included air will raise the mercury in the tube.

6. The pressure of the atmosphere varies at different altitudes. On going to the top of a high mountain, where the weight of the air is diminished. $\frac{1}{01}$, the boiling point of water is somewhat less than 207.

Having briefly described the air-pump, with the result of some of the most important experiments, we proceed to notice other pneumatic instruments.

The Syringe is a tube having a small orifice at one end; at the other is inserted a solid piston or cylinder, so exactly fitted that no air can pass, with a handle fixed to the piston. If that end which has the smaller orifice be put in water, and the piston be drawn back, the pressure of the atmosphere on the surface of the water will force it up into the tube; whence it may be forcibly expelled by pushing down the piston.

The Air-Gun, like the common gun or musket, consists partly of a long metal tube adapted to receive a ball, but the breech end of the tube or barrel has an opening to admit condensed air behind the ball, which, acting by its elastic force, propels it with a velocity proportioned to the degree of condensation of the air. Some of them are furnished with a syringe for compressing the air, included within the butt of the gun, and there is an exterior tube surrounding the barrel, so that the air is forced into the space between the tubes; and the ball having been introduced into the barrel, which it fits closely, a valve is opened by pressing on a knob or trigger, and the air rushes, from the cavity formed by the outer tube, into the chamber behind the ball, which it expels from the barrel, continuing to act upon it by its expansive force till the ball has passed from the mouth of the air-gun.

The Barometer is a most useful instrument to determine the variations of the weather; the invention of which appears to be justly attributed to Torricelli, professor of mathematics at Florence, in the earlier part of the seventeenth century. The barometer now in general use as a weather-glass is nothing more than a tube of proper length filled with mercury, and either dipped at the open end in a small cup of the same fluid, or else having the open end curved upwards, so that the mercury may be exposed to the pressure of the atmosphere; a scale of inches also is adapted to the upper part of the tube, extending from 27 to 32 inches, that it may appear by inspection at what height the mercury stands under the pressure of the atmosphere at any particular time.

The common Pump, sometimes called the suction pump, (fig. 4), is nothing more than a syringe so contrived that the water drawn into it passes through the piston by means of a valve, and is discharged above it, instead of being again forced out below.

It consists of two hollow cylindric pipes A and E, the latter of which usually terminates below in a perforated ball, through which the water in the well enters freely into the suction-pipe; and at its other extremity is a valve D, opening upwards, and affording a communication, when open with the upper pipe A. In this pipe, constituting the barrel, or body of the pump, the piston B moves air-tight vertically, and by its valve C opening upwards, it permits the water to pass above it and be discharged at the spout. Now suppose the piston to be at the bottom of the barrel in contact with the valve D, on lifting the former by depressing the lever handle of the pump, connected with the piston rod at F, the valve C will be closed by the pressure of the air above, and a vacuum being thus formed in the barrel, the same pressure on the surface of the water in the well will drive it up the suction-pipe, and raising the valve D, the water will enter the exhausted barrel, whence, by depressing the piston, the valve D will shut, and that at B rising, the water will pass upwards and be discharged through the spout. This pump cannot raise water beyond the extent of action of atmospheric pressure, the utmost limit of which will be about 33 feet.

The Lifting-pump, fig. 5, acts in much the same manner as the preceding, but the machinery is reversed. It consists of a hollow cylinder or barrel AB, in which is fixed the valve G, a little below the level of the water in the well or reservoir. A piston F, with a valve opening upwards, fits into the lower part of the barrel, in which it is moved vertically by means of the frame B C D E, connected with the piston-rod I. Now when the piston is at the bottom of the barrel, the pressure of the atmosphere on the surface of the water in the well will open the piston valve, and the water will rise to the same height within the barrel as without; and on lifting the piston, its valve F will close, and the water above it will be driven by the opening of the valve G into the upper part of the barrel: then the piston being depressed again, the valve F will open to admit more water into the lower part of the barrel, while that above will be prevented from returning by the closing of the valve G: and thus by continued working of the piston, the water will rise in the barrel till it escapes by the spout.

The Forcing-pump combines, in a great degree, the properties of those already described. It is composed of a hollow cylinder, the lower end of which dips into the water in the well: just above the valve, in the upper part of this cylinder, a lateral pipe branches off, having at a short distance from its origin another valve, both valves opening upwards; and in the upper part of the cylinder or barrel is a solid piston or plunger, moving air-tight vertically.

Now if the piston be depressed to the lower valve, and then raised, that will open, while the valve in the lateral pipe remains closed, and the pressure of the atmosphere on the water in the well will cause it to rise a little and expel a part of the air through the first valve; the piston then being lowered, that valve will close, and the air above it be expelled through the other valve; thus every elevation of the piston will make the water rise higher in the cylinder till it has expelled all the air, and it will consequently, at the next lifting of the piston, pass above the first valve, and the piston being again lowered, as the liquid cannot descend, the valve being closed, it will be forced into the lateral pipe, through its valve; and as it is prevented from returning again by that valve, it will continue to ascend with every down-stroke of the piston, and may thus be raised to any height required.

The Fire-engine is a modification of the forcing-pump, consisting essentially of two working barrels like an air-pump, but fitted with solid pistons, and valves corresponding with those of the forcing-pump; and thus water is drawn from any reservoir or source of supply, and propelled into a strong air-chamber, from the upper part of which passes a tube, having its interior extremity dipped under the surface of the water, which is thus driven through it by the pressure of the condensed air.

The modern art of Aerostation, or Aeronautics, depends on the application of the principle of specific gravity to the action of gases, &c. on solid bodies, and the consequent motion of the latter through the atmosphere. The invention of the air-balloon took place in France, in 1783.

The Air-balloon consists of a light bag of thin silk, fig. 6, of a globular or elliptic shape, and rendered air-tight by a coating of varnish, made by dissolving gum elastic in spirits of turpentine. When thus prepared it must be distended with some elastic fluid, lighter than common air; and it will thence acquire an ascending power equal to the difference between its weight, including the attached car and its contents, and that of the bulk of atmospheric air which the apparatus displaces. Aeronauts in general were accustomed to use inflammable air procured by dissolving pieces of iron or zinc in sulphuric acid diluted with water; a tedious, troublesome, and inconvenient operation; but latterly they have availed themselves of the convenience of procuring gas from the coal-gas companies, which has been found to be sufficiently adapted for the purpose.

## Section V.—Acoustics.

The science of Acoustics treats of the nature and properties of sound. The idea of sound is excited in the mind when the motions which take place in any of the bodies around us, are communicated to the auditory nerve, and thence to the brain. This effect is produced by means of the organization of the ear, the tremulous motions or vibrations of the air being propagated to the tympanum, or drum, a thin membrane which closes the aperture of the ear.

Air is the usual medium of sound, but it is not essential to the formation or the propagation of sonorous vibrations. Some substances however, either solid, liquid, or aerial, must form a continuous connexion between the sounding body and the ear; for sound cannot be conveyed through a vacuum. The velocity with which sound is propagated must depend on the nature of the medium by which it is conveyed. Atmospheric air being the general medium of sound, the investigation of its conducting power has at different periods occupied the attention of men of science. Dr. Halley, and Flamsteed, were led to the conclusion, that the common velocity of sound was 1142 feet in a second; and this deduction was confirmed by the varied and extensive researches of Dr. Derham, in consequence of which it has been generally adopted by subsequent writers on this branch of science. This statement, however, is now considered as requiring some correction on account of the influence of temperature; and from a comparison of the experiments of Derham, made in the day-time, with some more recent observations, it appears that the actual velocity of sound, at the zero of temperature of the centigrade thermometer (32° of Fahrenheit) is about 1130 feet in a second. By adopting either of the numbers last stated, sufficiently correct calculations may be made of the distances of objects, as inferred from the relative velocities of light and sound; the former from its extreme celerity being regarded as appearing instantaneously on its production, at distances not exceeding a few miles.

The conveyance of articulate sounds, by means of tubes through considerable distances from one part of a building to another, is now commonly practised in London and other places. The facility with which the voice thus circulates through tubes was probably known to the ancients, and certainly to the cultivators of philosophy in the middle ages. Pope Sylvester II., who lived in the tenth century, was regarded as a magician, because among the wonderful machines he constructed was a speaking head of brass. Albertus Magnus, and our countryman Roger Bacon, in the thirteenth century, incurred similar odium, in consequence of their having formed speaking figures. Of this nature was an exhibition which

took place at Paris several years since, and afterwards in London, styled the Invisible Girl, since the apparatus was so contrived that the voice of a female at a distance was heard as if it originated from a hollow globe not more than a foot in diameter, suspended freely from wooden frame-work, by slender ribbons. This is now exhibited at the Adelaide Gallery, West Strand.

In order to favour the deception as much as possible, the place chosen is a large and lofty room, where there seemed no situation for placing acoustic tubes or reflectors. In the centre of the room is a wooden frame about five feet high, inclosing a space five or six feet square. Fig. 7 is a perspective view of the apparatus. A A A A represent the four upright posts, which stand on glass feet, and which are united by a cross rail near the top B B. The frame, thus constructed, stands upon the floor, and from the top of each of the four pillars proceeds a strong bended brass rod *aaaa*, so that they all meet together at the top *c*, where they are secured by an ornament. From the top of these four rods is suspended a hollow copper ball M, about a foot in diameter, by means of slight ribbons, so as to cut off all possible communication with the frame. Round this ball are placed four copper tubes, in the shape of trumpets, T T, at right angles with each other, the large end opening externally. Such is the apparent construction of the apparatus; and it is pretended that there resides within the ball an invisible lady, capable of giving answers to any questions that are put to her. When a question is proposed, it is uttered at the mouth of one of the trumpets, and an answer immediately proceeds from all the trumpets, so distinct as to be heard by an ear applied to any of them.

Fig. 8, which represents a section of the apparatus, will explain the method by which the deception is effected. The real speaker is a female, concealed in an adjoining apartment, and the means by which the voice is made to issue from the globe in the manner stated, is at once very simple and ingenious. Two of the trumpet's mouths, T T, are exactly opposite apertures leading to tubes in two of the cross-rails, which, meeting at the angle A, open into another tube descending through the pillar, and which is continued under the floor into an adjoining apartment, where a person sitting may hear what is whispered into either of the trumpets, and return an appropriate answer by the same channel. A small hole closed with glass is left through the side wall of the room, so that the confederate may have an opportunity of observing and commenting on any circumstance which may take place in the room, and returning an appropriate answer to the questions proposed.

## Section VI.—Pyronomics.

This branch of natural philosophy, which has recently attained the rank and importance of a distinct science, is appropriated to the description of the properties and operations of heat. This term, which has been adopted by Sir John Leslie (from the Greek Πῦρ, fire, and Νόμος, a law,) signifies the laws of heat.

The nature and cause of heat have formed a subject of controversy among modern philosophers. Some conceive it to be a peculiar subtile fluid, of which the particles repel each other, but have a strong attraction for the particles of other matter. Others consider it as a motion or vibration of the particles of matter, supposed to differ in velocity in different cases, thus producing the different degrees of temperature. If, according to the former hypothesis, heat be considered a fluid, it is certainly destitute of weight, for it has been ascertained from experiment that the addition of heat to any substance produces no sensible alteration in its gravitative force. It must also be considered as an incoercible fluid, for, though it passes through some bodies with more difficulty than through others, there is no body or kind of matter which can completely arrest its progress. The terms caloric (from the Latin *calor*, heat,) and matter of heat, have been adopted to designate the hypothetical cause of those phenomena which are referred to the science of Pyronomics; and without admitting the separate existence of such an agent as the caloric of the French chemists, the term may sometimes be advantageously employed to denote the amount of effect produced by relative changes of temperature in the same or in different bodies.

The grand fountain of heat, or the principal cause of elevation of temperature, is the sun; but of the manner in which its effect is produced on bodies exposed to its rays, different opinions have been entertained. The popular notion concerning the nature and constitution of the sun, as the source of light and heat, is that of an inextinguishable mass of matter in a state of intense conflagration. Sir William Herschel, however, entertained a very different opinion relative to the nature of the solar orb, which, from numerous telescopic observations, he was led to imagine to be an opaque globular mass, encompassed by an atmosphere consisting of transparent elastic fluids, from the decomposition of which heat and light were continually proceeding.

By the observations of aeronauts, as well as of those who have ascended high mountains, it appears that there is a gradual decrease of heat in ascending above the surface of the earth. The best observations on this relative diminution of heat at increasing

heights, are those of Humboldt, derived from experiments made in the equatorial regions of America. The general result of his researches gives 121 toises of ascent for a diminution of 1° of Reaumur's thermometer.

Heat is propagated with more or less rapidity through all bodies; air is the worst conductor, and consequently mitigates the severity of cold climates by preserving the heat imparted to the earth by the sun. On the contrary, dense bodies, especially metals, possess the power of conduction in the greatest degree, but the transmission requires time.

Among the mechanical powers for producing, or rather of exciting heat, friction is perhaps the most usual and effective. In sawing wood, or boring metal, it may be observed that the substances thus exposed to friction soon become sensibly warm. The wheels of carriages sometimes take fire from friction against the axles when in rapid motion.

Compression is another mechanical means of producing heat, either in solids, liquids, or gases. An iron bar may be hammered until it is red-hot; and water strongly compressed gives out heat, as appears from the experiments of Dessaignes, as well as from the interesting researches of Mr. Perkins. The effect of heat in expanding solid bodies, and especially metals, has been advantageously applied to practical purposes. Thus coopers, in fixing iron hoops on a cask, make them previously very hot, and being adapted in that state to the periphery of the cask, their contraction in cooling binds together the staves of the cask.

As a dilating or expanding power, the influence of heat as applied to liquids is greater than in the case of solids. But the degree of action which it exerts is different with respect to different liquids; so that alcohol is more readily expanded than fat, oils, or ether; the latter are more expansible than water, and water more so than mercury.

This expansive power of heat on various material substances affords a convenient method of estimating the relative quantity of heat which will produce any given effect. Upon this principle depends the utility of those philosophical instruments called Thermometers and Pyrometers.

The Thermometer.—The invention of this useful instrument appears to have occurred in the early part of the seventeenth century; and the mode of measuring heat first attempted was by observing the expansion of air confined in a glass tube. But the original thermometer was a very imperfect instrument. Several men of science, therefore, employed themselves in contriving by various methods to augment the utility and accuracy of this

instrument. In 1730 Reaumur, in France, invented a thermometer filled with tinged spirit of wine, with a scale divided into 80° between the freezing and the boiling points of water.

The first employment of mercury, as the most suitable fluid for the thermometer, is usually attributed to Fahrenheit, a native of Dantzic, and his name has been permanently connected with that form of the thermometer now generally used in England, Holland, and the United States of North America. Fahrenheit's thermometer consists of a slender cylindrical tube, and a small longitudinal bulb. To the side of the tube is annexed a scale which Fahrenheit divided into 600 parts, beginning with that of the severe cold which he had observed in Iceland, in 1709, or that produced by surrounding the bulb of the thermometer with a mixture of snow or beaten ice, and sal ammoniac, or sea-salt. But the present method of making the scale of those thermometers which bear the name of Fahrenheit, and which is the sort in most common use, is first to immerse the bulb of the thermometer in ice, or snow just beginning to thaw, and mark the place where the mercury stands with a thirty-two ; then immerse it in boiling water, and again mark the place where the mercury stands in the tube, which mark with the number 212, exceeding the former by 180; dividing, therefore, the intermediate space into 180 equal parts, will give the scale of the thermometer, and which may afterwards be continued upwards and downwards at pleasure. Other thermometers of a similar construction have been accommodated to common use, having but a portion of the above scale.

The Pyrometer.—As there is no known liquid that continues unevaporated at a higher temperature than mercury, the relative effect of very high degrees of heat is usually estimated by the alteration of bulk that takes place in solid bodies. Heat generally expands substances of all kinds ; but Mr. Wedgwood observed that fine porcelain clay becomes contracted by exposure to great heat ; and he found, on investigation, that pieces of pure clay carefully dried, and then exposed to a red heat in a furnace, exhibited a sensible degree of contraction, which remained when they again became cool ; and as it further appeared that the contraction proceeded with the augmentation of heat, till vitrifaction took place in the clay, he conceived the idea of forming a pyrometer, or measurer of heat, consisting of a number of test-pieces of prepared clay, in the shape of small flattened cylinders, and a scale, composed of brass rods, $\frac{1}{4}$-inch square, and two feet long, fixed to a brass plate obliquely inclining inwards, so as to be somewhat nearer together at one end than at the other, and marked with a scale of equal parts, commencing at the wider extremity.

Each degree of Wedgwood's scale is equivalent to 130° degrees of that of Fahrenheit; and the former commences at 1077·5° of the latter scale.

Other pyrometers have been invented by various experimentalists, exhibiting different methods of measuring, with more or less accuracy, the relative expansion of bars or wires of iron, or of some other metal.

Steam is a term generally applied to the cloudy appearance which arises from the condensation of the aqueous vapour; but when used in connexion with the arts and manufactures, in which the vapour of water is employed, the term steam always implies water in its elastic form, at or above the temperature of 212°.

Steam is at present applied to many economical purposes, as well as in various manufactures, independent of its important office in the steam-engine. In dyeing, bleaching, and many other similar departments, it is used to communicate heat to water, instead of having separate fire-places and boilers. It has been also employed to great advantage for culinary purposes. It is made to communicate with vessels, in the form of boilers, as a substitute for having fires under them, which is a great advantage, both in the economy of fuel, and in avoiding, at the same time, the nuisance of ashes and smoke.

The STEAM-ENGINE.—But the most important purpose to which steam has been applied yet remains to be described. The general principle of the steam-engine, is the force derived from the property of water to expand itself, in an amazing degree, when heated above the temperature at which it becomes changed into steam, or vapour, which being an exceedingly elastic fluid, it can be retained within the close vessel or boiler to which the heat is applied, even when it has an expansive force sufficient to make it fill, if left at liberty, twenty or thirty times the space in which it is confined. In this state the steam will exert a proportionate force or pressure to burst open the sides of the vessel in which it is retained; which force may be applied either to expel or raise up water from any vessel into which the confined steam is admitted, or to give motion to a movable piston, which is so accurately fitted to the interior capacity of such a vessel, as not to permit the escape of the steam between them. The invention of the steam-engine is ascribed to an ingenious man, named Newcomen, who was a locksmith in the West of England. It was afterwards improved by Watt and others, and engines of various constructions are now made.

A reference to fig. 9, will enable the reader to form some idea of the principal parts of a steam-engine, and of its mode of

action. AB denotes the prineipal eylinder; P its piston, aeting by its rod Y on the extremity of the beam GH, the other extremity of whieh is eonneeted with the fly-wheel: CC, a tube, or passage, by whieh steam, formed in the boiler, is conveyed to the eonducting pipes TU, to be admitted on either side of the piston P alternately; O, the fly-wheel, whieh, by the rods RS moving eccentrieally, acts upon the rectangular lever V, which by means of the valve Z, regulates the admission of steam by the conducting pipes; M, the eonductor; X, a tube by whieh the steam passes from the cylinder into the eondenser; N, a tube to convey the water condensation to the pump L; F, the piston of the pump L, worked by its rod E attached to the beam GH; K, the piston rod of a pump to injeet water into the condenser. From this description, the mode of aetion of the engine may be readily understood. Suppose the piston P to be at the top of the cylinder AB, the lower part being filled with steam, then by means of the lever V, the steam valve Z will be drawn down so as to admit steam by the upper braneh of the conducting pipe U into the eylinder above the piston; and at the same time a passage will be opened to let the steam below escape into the eondenser. Thus the piston will be driven to the bottom of the cylinder, when the steam valve again opens to admit steam by the lower braneh of the conducting pipe T into the eylinder below the piston, while the other passage also opens to permit the steam above the piston to eseape through the tube X into the eondenser. Thus the manner in which the piston alternately rises and falls is shown, and by the connexion of its rod with the lever GH, it works the pumps, and turns the fly-wheel, whence the moving power may be propagated through trains of machinery for any purpose required. The fly-wheel may be moved in the manner represented in the figure, by a erank connected with a rod descending from the arm H of the great lever, or the toothed wheels ealled the sun and planet wheel. Steam-engines are now extensively employed in manufactures, in navigation, and in railroads.

## Section VII.—Optics.

Optics explain the nature and laws of vision, and include the generally reeeived theory of light and eolours. Opties may be advantageously introduced under the following divisions: 1. The general properties of light; 2. The laws of refraction, usually termed dioptrics, including the theory of vision; 3. Catoptrics, or the laws of reflection; 4. Chromatics, or the phenomena of

colours; and 5. Certain modifications of reflected or refracted light, resulting from its polarization.

I. General Properties of Light.—Light, considered as the cause of vision, or the medium by which objects become perceptible to the sight, exhibiting a variety of tints to the eye, has generally been supposed by Newton, and most of his immediate successors, to be a material substance emitted by all self-luminous bodies in extremely minute particles, moving in straight lines, with prodigious velocity, which, by impinging upon the optic nerves, produce the sensation of light. This subtile fluid, or ether, was considered as perpetually streaming in all directions from the sun and fixed stars, travelling with a velocity 900,000 times beyond that of sound through the air, and yet consisting of particles so extremely minute as to pass through the densest substances, without at all altering their structure, or interfering during their progress in the slightest degree with each other.

Many of the observed phenomena have been successfully explained by this theory; but there are others which it is totally inadequate to account for. Descartes, as early as the year 1630, had advanced a different hypothesis, which was adopted and improved by Huygens and others, but which was not generally admitted as correct till about the beginning of the present century, when Dr. Thomas Young, in the Bakerian Lecture, read before the Royal Society in 1801, entered into an elaborate disquisition concerning the theory of light and colours; and deduced from the principles laid down by Newton himself the three following hypotheses: 1. That a luminiferous ether, rare and elastic in a high degree, prevades the whole universe; 2. That undulations are excited in this ether whenever a body becomes luminous; 3. That the sensation of different colours depends on the frequency of vibrations excited by light in the retina. To these he added a fourth hypothesis, assuming that all material bodies have an attraction for the ethereal medium, by means of which it is accumulated within their substance, and for a small distance around them, in a state of greater density, but not of greater elasticity. Subsequent discoveries have tended to confirm the theory of undulation, which has been embraced by the most distinguished modern philosophers, as Fresnel, Aragnel, Sir John Herschel, Sir David Brewster, and others, who by their own discoveries have greatly contributed to extend the boundaries of science.

The following are the principal terms used in this branch of optics in relation to light, which before we proceed it will be needful to explain.

Fig. 13.

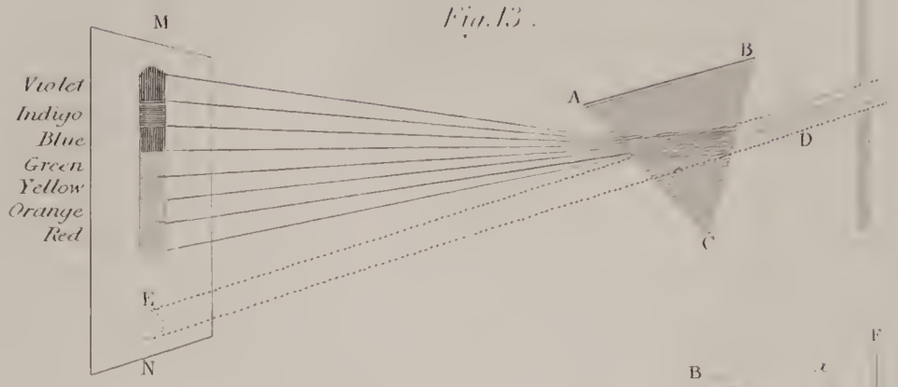



Fig. 10.

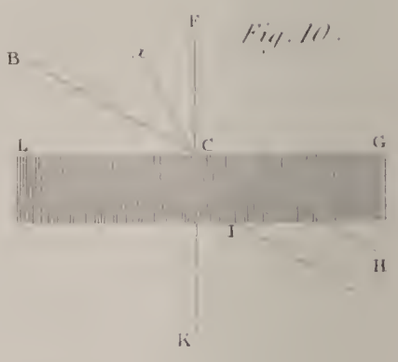



Fig. 11.

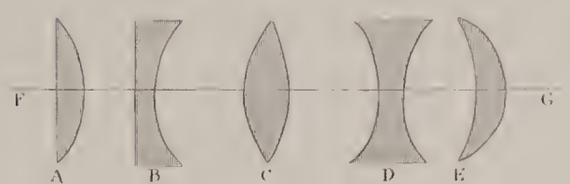



Fig. 12

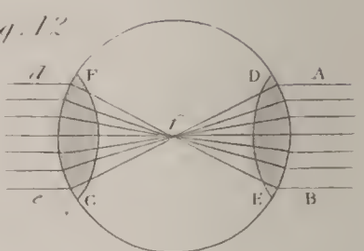



Fig. 14.

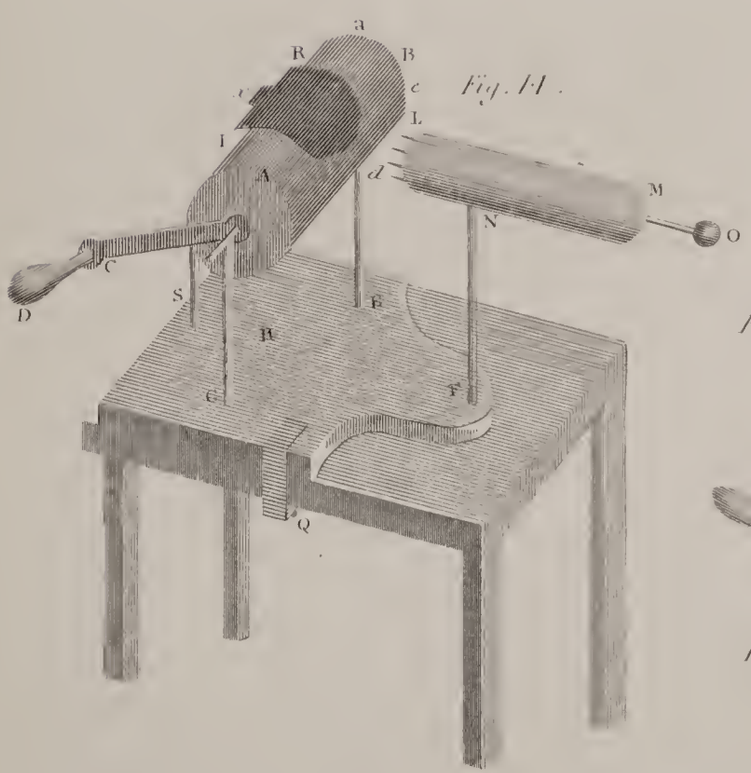



Fig. 15.

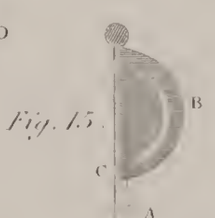



Fig. 16.




Fig. 17

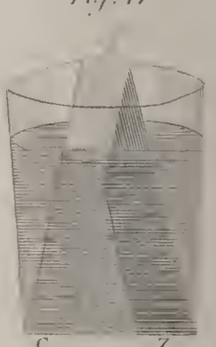



Fig. 18.

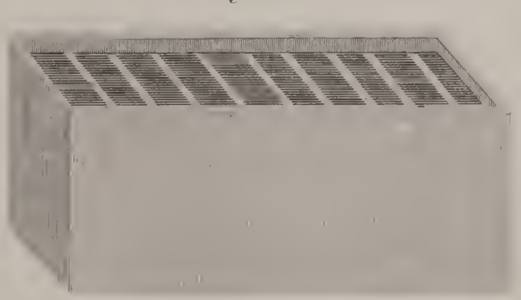
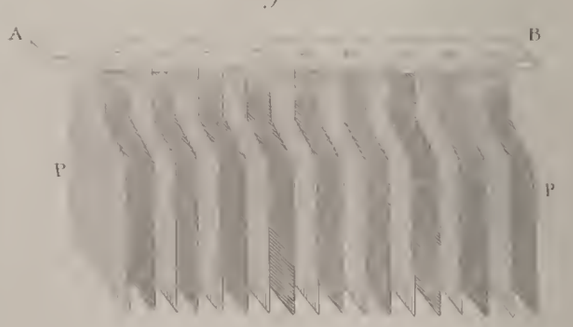


Fig. 19.



Any body which affords a ready passage for light, is called a transparent or diaphanous medium, as air, glass, water, &c. Bodies which do not allow the passage of light through them, are called opaque, as stone, wood, &c.

A ray, or pencil of light, is any exceedingly small portion of light from a luminous body. A beam of light is a body of parallel rays; a pencil of rays is a body of diverging or converging rays.

Rays continually separating as they proceed from a point, are called diverging; rays which tend to a common point are called converging; when the lines in which they move are parallel, they are called parallel rays.

The point whence diverging rays proceed, is called the radiant; that to which converging rays tend, is called the focus. A ray of light bent from a straight course in the same medium, is inflected; when turned back on the surface of a body it is reflected; and when turned out of its course, in passing into another medium, it is refracted.

The Angle of Incidence is that between the line of the incident ray (or that which falls on any plane or curved surface) and a line perpendicular to the surface on which the ray strikes, raised from the point of incidence. Thus, the angle *b c f*, Plate II. fig. 10, is the angle of incidence.

The Angle of Refraction, is that between the line of the refracted ray, and a line perpendicular to the refracting surface, at the point in which the ray passes through. Thus the angle *i c k*, fig. 10, is the angle of refraction.

The Angle of Reflection is that contained between the perpendicular and the reflected ray, as F C E, fig. 10. These angles of incidence and reflection are always equal.

II. The Laws of Refraction.—When rays of light pass obliquely from one transparent medium to another, either more or less dense, they are bent out of their former course. The effect thus produced is termed Refraction; and the laws by which the phenomena are regulated constitute the science, or branch of science, called Dioptrics. The effect just described may be exemplified by the following simple experiments:—Put a small stick in a bowl of water, and the end appears bent, because of the refraction. Mark in the bowl, and place a sixpence where the shadow of the side appears from a candle; pour in water, and the shadow appears to change situation. Place the bowl with a shilling in it where the eye (stationary) can just see the edge, pour in water, and the light will be so refracted that the whole of the shilling will be distinctly seen. Put a shilling in a wine-

glass; pour on water, and the refracted rays will present another image higher than that of the shilling, and both reach the eye. Rays of light are always in a denser medium, refracted towards a perpendicular to the surface, which refraction is in proportion to the obliquity of the rays of light falling on the refracting surface.

Availing themselves of the principle of refraction, philosophers have contrived surfaces in which the perpendiculars constantly vary, and produce new and important effects. This they do by convex and concave glass lenses, that collect or disperse the passing rays of light.

The following are various kinds of lenses, named according to their forms:—A plano-convex lens has one side flat, and the other convex, A, fig. 11; a plano-concave is flat on one side, and concave on the other, B, fig. 11; a double convex is convex on both sides, C, fig. 11; a double concave is concave on both sides, D, fig. 11; a meniscus is convex on one side, and concave on the other, E, fig. 11. The axis of a lens is a line through the centre; thus F G is the axis to the five lenses.

When parallel rays fall upon a plano-convex lens, they are so refracted as to unite in a point behind, called the principal focus, or focus of parallel rays. The distance from the middle of the glass to the focus, is called the focal distance; which in a plano-convex lens, equals the diameter of the sphere of which the lens is a portion. The focal distance of a double convex lens equals the radius of a sphere of which the lens is a portion, fig. 12.

All the parallel solar rays which pass through a convex glass, as D E, or *c d*, fig. 12, are collected in its focus *f* or C, and the force of their heat is to the common heat of the sun, as the area of the glass is to the area of the focus. If a lens four inches in diameter, collect the sun's rays into a focus distant twelve inches, the image will not exceed one-tenth of an inch; the surface of it is 1600 times less than that of the lens; therefore the heat will be 1600 times greater in the focus than at the lens. Hence are constructed common burning glasses.

The following are the principal phenomena of rays in connexion with various lenses:—Through a convex surface, passing out of a rarer into a denser medium, parallel rays become converging. Diverging rays are made to diverge less, to become parallel, or to converge, according to the degree of divergency before refraction, or of the convexity of the surface. Converging rays, towards the centre of convexity, suffer no refraction. Converging rays to a point beyond the centre of convexity, are made more converging. Converging rays towards a point nearer the surface than the centre of convexity, are made less converging by refraction. The

contrary occurs when the rays proceed out of a denser into a rarer medium.

When rays pass out of a rarer into a denser medium, through a concave surface, if parallel before refraction, they are made to diverge. If they are divergent, they diverge more, suffer no refraction, or diverge less, according as they proceed from some point beyond the centre, from the centre, or some point between the centre and the surface. If they are convergent, they are either made less convergent, parallel, or diverging, according to their degree of convergency before refraction. And the reverse, passing out of a denser into a rarer medium.

Most of these propositions may be confirmed in a darkened room, by placing a lens, convex or concave, fixed in a frame moveable perpendicularly along a bar of wood, or table, at different distances from a lighted candle placed perpendicularly on the same bar, and receiving the images upon white paper. Upon this bar, on one side of a line over which the convex lens is placed, let a line, perpendicular to the last, be divided into parts 1, 2, 3, 4, &c. equal to the distance of the focus of parallel rays; and on the other side, above the lens, place a line similarly divided, and let the first division farther from the lens than the focus, be subdivided into parts equal to $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, &c. the distance of the focus of parallel rays: a candle placed over the division 2, will form a distinct image on paper held over the division $\frac{1}{2}$; over 3, the image will be at $\frac{1}{3}$, &c., whence it appears that the distances of the corresponding foci vary reciprocally.

Organs of Vision.—There is some variety in the construction of the eye in different animals, according to the element in which they live, but the general principle is the same. The eyes are situated in the bony cavities named orbits, where they are surrounded by several parts, which are either intended to protect them from external injury, or to assist in their motion.

The eye is of a globular form, and is composed of three coats, covering one another, and inclosing different substances, called humours.

The three coats are the sclerotica, the choroides, and the retina.

The three humours are the aqueous, the crystalline, and the vitreous

Objects are seen by means of their images being painted on the retina of the eye.

Though the images of objects are painted on the retina in an inverted state, yet they are seen erect.

Dimness of sight generally attends old people, which may arise

either by the eyes growing flat, and not uniting the rays of the retina; or by the humours losing their transparency in some degree, which makes every object appear faint and indistinct.

III. The Laws of Reflection.—When a ray of light falls upon any body, however transparent, the whole of it never passes through the body, but some part is always reflected from it; and by this reflected light, bodies which have no light of their own, become visible to us. Of that part of the ray which enters, another part is also reflected from the second surface, or that which is farthest from the luminous body. When this part arrives again at the first surface, part of it is reflected from that surface, and thus it continues to be reflected between the two surfaces; and to pass backwards and forwards within the substance of the medium, till some part is totally extinguished. Besides this inconsiderable quantity, which is lost in this manner, the second surface often reflects much more than the first; so that, in certain positions, scarcely any rays will pass through both sides of the medium. A very considerable quantity is also unaccountably lost at each reflecting surface; so that no body, however transparent, can transmit all the rays which fall upon it; neither, though it be ever so well fitted for reflection, will it reflect them at all. The reflection of light is not so easily explained as the refraction. This last property may be accounted for in a satisfactory manner, by the supposition of an attractive power diffused throughout the medium, and extending a very little way beyond it; but with regard to reflection, there seems to be no satisfactory hypothesis hitherto adopted.

The fundamental law of the reflection of light is, that the angle of reflection is always equal to the angle of incidence. This is found by experiment to be the case, and may also be demonstrated mathematically, from the laws of impulse in perfectly elastic bodies. The axiom, therefore, holds good in every case of reflection, whether it be from plane or spherical surfaces; and hence the following propositions, relating to the reflection of light from plane and spherical surfaces, may be deduced:—

1. Parallel rays reflected from a concave surface are made converging. Converging rays falling upon a concave surface are made to converge more. Diverging rays falling upon a concave surface, if they diverge from a focus of parallel rays, become parallel; if from a point nearer the surface than that focus, they diverge less than before reflection; if from a point between that focus and the centre, they converge, after reflection, to some point on the contrary side of, and farther from, the centre than the point of diverging; if from a point beyond the centre, they converge

to a point on the contrary side, but nearer than the point of diverging: if from the centre, they will be reflected thither again. The above propositions may be verified by placing a concave mirror at proper distances from an open orifice, or a convex or a concave lens, through which a solar ray passes. 2. Parallel rays reflected from a convex surface are made diverging. Diverging rays reflected from a convex surface are made more diverging. Converging rays reflected from a convex surface, if they tend towards the focus of parallel rays become parallel. If to a point nearer the surface of that focus, they converge less than before reflected. If to a point between that focus and the centre, they diverge as from a point on the contrary side, farther than the point towards which they converge. If to a point beyond the centre, they diverge as from a point on the contrary side, nearer than the point towards which they first converged. And if towards the centre they proceed on reflection, as from the centre. The preceding propositions may be illustrated by receiving, upon a convex mirror, a solar ray passing through an open orifice, or a concave or a convex lens.

Common plane mirrors are formed of glass, to the back of which is attached an amalgam, or mixture of tin and quicksilver, which, adhering to the surface of the glass, forms a smooth polished plane, capable of reflecting the rays of light which impinge on it more abundantly than almost any other kind of mirror. The effect of light reflected from a convex mirror is to produce a miniature picture of any object placed opposite to it; the images thus formed appearing to the eye of the observer in front, to be situated within or behind the mirror. Concave mirrors exhibit a variety of phenomena depending on the situation of the object with respect to the mirror and to the observer, some of which are highly curious and interesting. "The concave mirror," says Sir David Brewster, "is the staple instrument of the magician's cabinet, and must always perform a principal part in all optical combinations."

IV. The Theory of Colours.—One of the most striking and important properties of light is that of communicating colour to bodies. According to the popular idea, the variety of colours is owing to some inherent qualities in the substances on whose surfaces we perceive them; and thus, in using the phrases, a red brick or a green wafer, an uninformed person would conceive the redness of the brick, or the green tint of the wafer, to be the peculiar properties of those bodies. But we find from experiment that, though colour partly depends on the texture of substances, and the nature of their surfaces, the essentially efficient cause of

colour is light, since not only are bodies destitute of colour in the absence of light, but their colours may be altered by subjecting to certain modifications the light by which they are rendered visible. The influence of light in the production of colour is remarkably modified by refraction. Rays of light are differently refrangible, or refractible, that is, are more or less easily turned out of their course; and they are also differently reflexible, or more or less easily reflected. Light is called homogeneous, when all the rays are equally refrangible: and heterogeneous, when some rays are more refrangible than others. The colours produced by homogeneous rays are called primary or simple; those of heterogeneous, secondary or mixed.

It is on the principle of the different refrangibility of light, therefore, that the whole theory of colours may be said chiefly to rest. For the discovery of this fundamental property we are indebted to Sir Isaac Newton, as the result of the most laborious and patient investigation.

The dissection of a ray of solar light into different colours, by refraction, may be accurately displayed by admitting a ray through an aperture in a window shutter into a darkened chamber, and causing it to fall on a diaphanous prism, A B C, fig. 13. A ray, D, thus entering, and suffered to pass unobstructed, would form on a plane surface a circular disc of white light, E, but the prism being so placed that the ray may enter and quit it at equal angles, it will be refracted in such a manner as to form on a screen, M N, properly placed, an oblong image, called the solar spectrum, and divided horizontally into seven coloured spaces, or bands of unequal extent, succeeding each other in the order represented: red, orange, yellow, green, blue, indigo, violet. These bands are not separated by distinct lines, so that it is difficult to determine where one ends and another commences, the several tints at their borders being blended, and each almost imperceptibly uniting with those next it; the whole spectrum exhibiting the seven principal colours, with intermediate shades or mixtures. Bands of colours more precisely terminated may, however, be obtained by receiving the ray on a lens, before it is allowed to fall on the prism; and the image thus formed will be more extended in length, and very narrow. Similar phenomena may be produced by means of other kinds of light as well as that of the sun; and all transparent substances, in masses not terminated by parallel surfaces, have in some degree the same effect as the glass prism. If the whole spectrum be divided into 360 parts, the red will occupy forty-five of them, the orange twenty-seven, the yellow forty-eight, the green and the blue sixty each, the indigo forty, and the violet eighty. These numbers, however, are by no

means constant, depending on the peculiar nature of the refracting body, employed to dissect a ray of white light.

The Rainbow is among the most interesting natural phenomena connected with optics, the production of which wholly depends on the refraction and reflection of the sun's rays by clouds or drops of rain, and the consequent formation of prismatic colours. The rainbow is a meteor in form of a party-coloured arch, or semicircle, exhibited only during rain; and seen in that point of the heavens opposite to the sun. There is sometimes, though not always, distinctly visible, a secondary, or much fainter rainbow, investing the former at some distance. When the sun shines upon the drops of falling rain, the rays which come from those drops to the eye of the spectator, after one reflection and two refractions, produce the innermost, or primary rainbow. The colours of this bow, beginning at the lower margin and proceeding upward in order, are violet, indigo, blue, green, yellow, orange and red; so that it contains all the beautiful and simple shades which are exhibited by the prism. The secondary or external bow displays the same colours, but more faintly; and the colours in this arc arranged in a contrary order to the former; the red being on the lower margin, and the violet on the upper.

V. Polarization of Light.—The discovery of this property of light was made by M. Malus, colonel of the imperial corps of engineers, in France, in 1810. Having accidentally turned a doubly refracting prism to the windows of the Palace of the Luxembourg, which were at the time illuminated by the setting sun, he was surprised to observe that one of the double images of the windows vanished alternately during the rotation of the prism, and after various fruitless speculations on the cause of this singular phenomenon, he was conducted to this great discovery, that light reflected at a particular angle from transparent bodies, is polarized like one of the rays produced by double refraction.

"The phenomena of the polarization of light," says Sir John Herschel, "are so singular and various, that to one who has only studied the common branches of physical optics, it is like entering into a new world, so splendid as to render it one of the most delightful branches of experimental inquiry, and so fertile in the views it lays open of the constitution of natural bodies, and the minuter mechanism of the universe, as to place it in the very first rank of the physico-mathematical sciences, which it maintains by the rigorous application of geometrical reasoning, which its nature admits and requires."

In general, when a ray of light is reflected from a pane of plate glass, or any other substance, it may be reflected a second

time from another surface, and it will also pass freely through transparent bodies; but if a ray of light be reflected from a pane of plate glass at an angle of 57°, it is rendered totally incapable of reflection at the surface of another pane of glass in certain definite positions, but will be completely reflected by the second pane in other positions. It likewise loses the property of penetrating transparent bodies in particular positions, whilst it is freely transmitted by them in others. Light so modified, as to be incapable of reflection and transmission in certain directions, is said to be polarized. This name was originally adopted from an imaginary analogy in the arrangement of the particles of light, on the corpuscular doctrine, to the poles of the magnet, and is still retained in the undulatory theory. If a brown tourmaline, which is a mineral generally crystallized in the form of a long prism, but cut longitudinally, that is, parallel to the axis of the prism, into plates about the thirtieth of an inch in thickness, and the surfaces polished, luminous objects may be seen through them, as through plates of coloured glass. The axis of each plate is, in its longitudinal section, parallel to the axes of the prism whence it was cut. If one of these plates be held perpendicularly between the eye and the candle, and turned slowly round in its own plane, no change will take place in the image of the candle; but if the plate be held in a fixed position, with its axis or longitudinal section vertical, when a second plate is interposed between it and the eye, parallel to the first, and turned slowly round in its own plane, a remarkable change will be found to have taken place in the nature of the light, for the image of the candle will vanish and appear alternately at every quarter revolution of the plate, varying through all degrees of brightness down to total, or almost total, evanescence, and then increasing again by the same degrees, as it had before decreased. These changes depend upon the relative positions of the plates. When the longitudinal sections of the two plates are parallel, the brightness of the image is at its maximum; and when the axes of the sections cross at right angles, the image of the candle vanishes. Thus the light, in passing through the first plate of tourmaline, has acquired a property totally different from the direct light of the candle. The direct light would have penetrated the second plate equally well in all directions, whereas the refracted ray will only pass through it in particular positions, and is altogether incapable of penetrating it in others. The refracted ray is polarized in its passage through the first tourmaline, and experience shows that it never loses that property, unless when acted upon by a new substance. Thus one of the properties of polar-

ized light is proved to be the incapability of passing through a plate of tourmaline perpendicular to it, in certain positions, and its ready transmission in other positions at right angles to the former.

Iceland spar, a carbonate of lime, which, by its natural cleavage, may be split into the form of a rhombohedron, possesses this property in an eminent degree, as may be seen by pasting a piece of paper, with a large pin hole in it, on the side of the spar farthest from the eye. The hole will appear double when held to the light. For the same reason one image is called the ordinary and the other the extraordinary image. When the spar is turned round in the same plane, the extraordinary image of the hole revolves about the ordinary image which remains fixed, both being equally bright. But if the spar be kept in one position, and viewed through a plate of tourmaline, it will be found that, as the tourmaline revolves, the images vary in their relative brightness—one increases in intensity till it arrives at a maximum, at the same time that the other diminishes till it vanishes, and so on alternately at each quarter revolution, proving both rays to be polarized; from one position the tourmaline transmits the ordinary ray, and reflects the extraordinary, and after revolving 90°, the extraordinary ray is transmitted, and the ordinary ray is reflected. Thus, another property of polarized light is, that it cannot be divided into two equal pencils by double refraction, in positions of the doubly refracting bodies, in which a ray of common light would be so divided.

## OPTICAL INSTRUMENTS.

There are two principal kinds of optical instruments, namely, those which may be more properly called dioptrical, as they consist of one or more lenses, their effects depending on the refraction of light; and those called catadioptrical instruments, in the construction of which lenses and mirrors are combined; and hence telescopes of this description have been termed reflecting telescopes, to distinguish them from other telescopes, whose powers depend on refraction alone. The perfection of these instruments must consist in the excellence of the lenses and mirrors of which they are formed, and in the accuracy of their arrangement, so that the axes of the respective glasses may be situated in a right line.

Spectacles.—The employment of convex or common spectacles, or at least of single convex glasses to assist the sight, has been supposed to have originated about the close of the thirteenth century. There are two distinct kinds of spectacles, namely, those

with convex glasses, which magnify objects or bring their images nearer the eyes; and those with concave glasses, which diminish the apparent size of objects, or extend the limits of distinct vision. In old persons the transparent cornea becomes more flattened than in youth, and probably the crystalline humour undergoes a corresponding alteration, in consequence of which the rays coming from objects, do not converge to a focus, so as to form a distinct image on the retina, unless they are relatively at a considerable distance from the eye. These may be therefore assisted by convex glasses. Those called short-sighted persons are such as have the transparent cornea unusually prominent, and therefore the rays from objects entering their eyes converge to a focus before they reach the retina, unless any object be placed very near the eye.

Microscopes are instruments for viewing small objects, which they apparently magnify, by enabling us to see them nearer than with the naked eye, without affecting the distinctness of vision. There are three kinds of microscopes,—the single, the compound, and the solar.

The single microscope is a small double convex lens, between the object placed in the focus, and the eye at the same distance.

The compound microscope has both object-glass and eye-glass. Its power is in proportion to the image exceeding the object, and also to the ability to view it at a less distance. There are often three eye-glasses, by which the object is less magnified, but more of it is seen.

The solar microscope depends on the sun-shine, and is used in a darkened room. It consists of a tube, looking-glass, convex lens, and single microscope. The looking-glass reflects the sun's rays through the tube upon the object, whose image is thrown upon a white screen, &c. at a distance. Mr. George Adams, an eminent optician, invented an instrument which he called the Lucernal Microscope, so constructed that the objects might be illuminated by the light of a lamp, and thus the microscope could be used at any time, or in any situation. An improvement on this mode of displaying highly magnified images of minute objects has recently been adopted, by employing the splendid light produced by the combustion of oxygen and hydrogen gases on lime; and instruments have been fitted up for the public exhibition, in the metropolis, of some of the most curious and interesting phenomena with which optical science has made us acquainted.

Telescopes are used for discovering objects at a great distance; and are of two kinds, the refracting and the reflecting.

The most simple kind of refracting or dioptrical telescope is that termed the astronomical telescope, consisting of two convex

lenses, an object-glass and an eye-glass, the foci of which concur in the same point. This instrument exhibits objects in an inverted position, and therefore can seldom be employed except for astronomical purposes.

A telescope to shew objects in their natural posture, has two additional lenses, which give an erect posture to objects. The three eye-glasses have equal focal distances, and the magnifying power is found by dividing the focal distance of the object-glass by that of one of the eye-glasses.

The difficulty of managing refractors when of great length, induced philosophers to attempt the construction of telescopes that should perform on the principle of reflection, instead of that of direct vision. By these attempts, shorter and more convenient instruments were at length produced, and which in other respects answer for the purposes of observation much better; for a reflector six feet long will magnify an object as much as a refractor of 100 feet in length.

The Camera Obscura is made by fixing a convex glass in a hole of a window shutter, and if light enters the room only through the glass, the pictures of all objects on the outside may be seen in an inverted position on a white paper placed in the focus of the lens. When the convex lens is placed in a tube inside a box with a looking glass sloping backwards, it is called a portable camera obscura.

The Camera Lucida, invented by Dr. Wollaston, is an instrument analogous in its effects to the preceding, but of smaller dimensions, and therefore more convenient for many purposes, as for delineating distant objects, and for copying or reducing drawings.

The Magic Lantern is an instrument used to magnify paintings on glass, and throw their images upon a white screen in a darkened room. It is composed of a square tin box, containing a lamp, behind which is placed a metallic concave reflector, and in front of the lamp is a plano-convex lens, which receives on its plane surface the reflected light of the lamp, and concentrates it on the object, which is magnified by another lens fitted to the extremity of a tube projecting from the lantern. The objects are painted on thin plates of glass, which may be passed through a narrow opening in the tube between the two lenses. This tube must be double, one end moving within the other, so that the tube carrying the outer lens may be drawn backwards or forwards till the object is in the conjugate focus of that lens. Then if it be turned towards a vertical screen, a magnified image will be formed, and the further the lantern is withdrawn from the screen, the

larger will the object appear, but when the distance is considerable it becomes indistinct.

## Section VIII.—Electricity.

The various phenomena connected with this science form a most interesting subject of inquiry. In order to form some just conception of the facts relating to any of the physical sciences, it is usual to lay down some of the leading principles in a theoretical form, by the aid of which their connexion can be represented to the mind, so as to combine them into an intelligible system. An hypothesis which naturally suggests itself for the explanation of electrical phenomena, is that of a very subtile and highly elastic fluid, pervading the earth and all other material bodies, but itself devoid of any sensible gravity. We must suppose this fluid to be capable of moving, with various degrees of facility, through the pores or actual substance of different kinds of matter, and the term electricity, or electric fluid, may be employed to designate it. But we should carefully avoid considering it as a palpable form of matter, the existence of which can be directly demonstrated. Instead of which, it should be regarded as merely a convenient method of explaining certain appearances, and showing their mutual relations, so that we may be enabled to contemplate them in connexion with each other. Dr. Franklin advanced the theory of a particular fluid existing in all bodies, and of which each, according to its capacity, possessed a relatively greater or smaller quantity. When this fluid is in a state of equilibrium, or equally distributed among two or more bodies in communication with each other, it is quiescent, and no particular effects are perceived; but if the equilibrium be destroyed, as by the contact of a body in a different electrical state, a new distribution takes place, and various phenomena may arise from the passage of electricity from one body to another. It further appeared that bodies in a similar state of electricity, whether of excess or deficiency, always attracted each other; while bodies similarly electrified constantly repelled each other: the terms positive and negative electricity were therefore adopted to designate the states of bodies, as to the quantities of electric fluid contained in them. This theory accounts satisfactorily for some of the most important phenomena, but there are others to which it appears to be inapplicable; in consequence of which, though once generally received, it is now almost entirely abandoned, and has been replaced by an hypothesis originally proposed by Mr. Symmer, an ingenious philosopher, who ascribed the appearances observed to the existence of two kinds of electric fluid, and their separate or united influence under various circumstances.

According to this system all bodies in nature contain electric fluid; and the earth itself is to be regarded as an immense reservoir of electricity. This fluid is supposed to consist of a combination of two distinct ethereal essences, which neutralize each other; and it is only when they are separated that electrical phenomena are observed. To these fluids English philosophers, borrowing in part the phraseology of Franklin, have generally given the names of positive and negative fluids. In France, however, the former has been termed the vitreous fluid, because it is that which is commonly produced by the friction of glass; and the latter has received the designation of the resinous fluid, as it is in the same manner exhibited by the friction of resin or sealing-wax; but whether there really be two different fluids, or that the mutual attraction and repulsion of bodies arise from the redundancy and deficiency of their electricities, is of no consequence, since all the phenomena can be explained on either hypothesis.

Having stated the subject hypothetically, we proceed to adduce some of the principal facts. According to the popular idea then, the earth and all the bodies with which we are acquainted are supposed to contain a certain quantity of an exceedingly subtle fluid, called the electric fluid. The certain quantity belonging to all bodies is called their natural share, and produces no sensible effects. When any body becomes possessed of more or less than its natural quantity, it is said to be electrified, and is capable of exhibiting certain appearances which are ascribed to the power of electricity.

Take a stick of sealing-wax and rub it with your hand, or with a piece of flannel, or on your coat sleeve, and it will have the power of attracting small bits of paper, or other very light substances, when held near them.

If a clean and dry glass tube be rubbed several times upwards and downwards, and then presented to any small light substance, it will immediately attract and repel them alternately for a considerable time. The tube is then said to be excited.

If a glass tube be rubbed several times in the dark, and then brought within about half an inch of the finger, a lucid spark will be seen between the finger and the tube, accompanied with a snapping noise, and the finger at the same time will perceive the sensation of a prick from a pin. The attraction, repulsion, sparkling, and noise, are the effects of electricity, and are denominated electrical appearances.

If an oblong piece of metal, such as a poker, be suspended by means of a dry silk string, and the excited glass tube be presented to its upper end, then the lower end of the metallic body will

exhibit the same phenomena as the tube itself, which shows that the electric fluid passes through the metal.

If, instead of the metallic body, a stick of glass or sealing-wax be suspended, none of these phenomena will be exhibited, which proves that the electric fluid does not pass through these substances.

All those bodies which, like the metallic substances, transmit electricity, are called conductors of that fluid. Those substances that will not transmit the electric fluid are called electrics, or non-conductors.

The metals, semi-metals, and metallic ores, are conductors of electricity; so also are charcoal, water, and other fluids, excepting the aerial fluids of oil. Almost all saline and many earthy substances are also conductors.

The following substances are electrics, or non-conductors of electricity; namely, vitrified substances, precious stones, amber, sulphur, resinous substances, wax, silk, cotton, feathers, wool, hair, paper, elastic fluids, sugar, oils, metallic oxides, animal and vegetable ashes, dry vegetable substances, as baked wood, &c.

All substances become conductors when they are made hot.

When a body has more than its natural quantity of this fluid, it is said to be positively electrified: when it has less than its natural share, it is said to be negatively electrified.

When a conductor is so surrounded by non-conductors that the electric fluid cannot pass from it to the earth, it is said to be insulated.

The human body is a good conductor of electricity; but if a person stand on a cake of resin, or on a stool supported by glass legs, the electric fluid cannot pass from him to the earth.

The principal method of exciting the electric fluid is, by friction. When a conductor and an electric are rubbed against each other, the electric is the most powerfully excited: in this case the electric fluid passes from the conductor to the electric.

If a smooth glass tube be rubbed with the hand, the electric fluid will leave the hand, and pass upon the tube, which will now have more than its natural quantity. If the finger of any conducting substance be presented to the tube, the electricity will pass to it.

Two substances, both positively or both negatively electrified, repel each other. Two substances, of which one is positively and the other negatively electrified, attract each other.

If the person who rubs a glass tube be insulated, both the person and the glass become electrified, and capable of attracting and repelling light bodies; but the electricity of the person will

differ from that of the tube, as the following experiments will show.

*Experiment*—1. Let two cork balls, connected by a linen thread, be held by a silk thread, attached to the middle of the former, at some distance from a wall; then bring the excited tube near the balls, and it will first attract, and soon after repel them; this repulsion will continue for a considerable time, though the tube be removed.

2. Let another pair of cork balls be brought in contact with the insulated person, and they also will repel each other.

3. But if the two pairs of balls be brought near, they will attract each other, and the electrical virtue will disappear; which shows that there are two electricities, one being the reverse of the other, and seeming to have what the other wants.

4. If the insulated person rub a stick of sulphur, or resin, or sealing-wax, that substance will acquire the electricity which in the preceding experiment was acquired by the insulated man.

Hence positive and negative electricity have been called vitreous and resinous.

These electricities always accompany each other, for, if any substance acquire the one, the body with which it is rubbed acquires the other.

When one side of a conductor receives the electric fluid, its whole substance is instantly pervaded with it; whereas, when an electric is presented to an electrified body, it becomes electrified in a small spot only.

If to one side of an electric, namely, a pane of window glass, you communicate positive electricity, the opposite side will be negatively electrified, and that plate is said to be charged.

The positive and negative electricities cannot come together, unless a communication by means of conductors is made between their sides.

When the two electricities are united, their virtues are destroyed, and the act of their union is called the electric shock.

Machines have been contrived for rubbing together electrics and conductors, and for collecting the electric fluid from surrounding bodies. These are called electrical machines.

Fig. 14 represents an electrical machine of the simplest sort. GEF is a strong board, which supports all the parts of this machine, and which may be fastened to a table by means of one or more iron or brass clamps, as Q; the glass cylinder AB is supported by the two glass legs G and E; IK is the rubber, and IRK is a silken flap. This cushion or rubber is fastened to a spring which proceeds from a socket cemented on the top of the

glass pillar S. The lower part of this pillar is fixed into a small board, which slides upon the bottom board of the machine, and by means of a screw-nut and a slit at H, may be fixed more or less forward, in order that the rubber may press more or less upon the cylinder. NF is a glass pillar which is fixed in the bottom board, and supports the prime conductor, ML, of hollow brass or tin plate, which has the collector or pointed wires at L, and a knobbed wire at M. From the brass knob, O, a longer spark may be drawn than from any other part of the conductor. When the cylinder is turned swiftly, the friction of the glass against the rubber causes the electric fluid which was in the rubber to pass to the glass, from whence it is conveyed to the prime conductor, the points of which, *a*, are presented to every part of the cylinder in succession. If one end of a chain be put on the knob *x*, and the other end hang on the ground, there will be a constant supply of the electric fluid to the prime conductor, which will be discharged in sparks to any body presented to it. The rubber is supplied by means of the things in immediate contact, and these again are supplied by the general mass of the fluid that is lodged in the earth.

Electrical Attraction and Repulsion.—Bodies that are charged with the same electricity repel each other; but if one have more and the other less than its share, they will attract one another.

*Experiment*—1. If a tuft of feathers be hung on the prime conductor, LM, the moment they are electrified by turning the wheel of the machine, they will endeavour to avoid one another and stand erect, because, being all electrified by the same electricity, they repel each other.

2. A large feather will, if placed in the hole *z*, when the machine is worked, become beautifully turgid, expanding its fibres in all directions; and they collapse when the electricity is taken off by presenting any conducting substance to them.

3. Excite a glass tube eighteen or twenty inches long, then present to it a small feather, which will first be attracted by it, and afterwards jump from it. If no other body happen to be in the way, it will tend towards the ground; but if the tube be held under it, it will be still repelled, and may be driven about for a considerable time.

4. Suspend a plate of metal from the conductor, and, underneath it, at the distance of about three or four inches, put another plate of the same size; upon the lower one small feathers, pieces of paper, &c., may be placed; these will, as soon as the machine is worked, jump to the plate, from which they will be repelled, and

fly to discharge themselves upon the lower plate, from which they will be repelled again, and so continue till the electricity of the upper plate is completely discharged.

5. If two balls made of cork or of the pith of alder, about the size of large peas, be fastened to silk threads, they will hang parallel to each other, so as to be in contact, but when brought near the electrified prime conductor, they will strongly repel each other.

6 These balls, in their electrified state, show whether the electricity is positive or negative; for, if it be positive, by applying an excited stick of sealing-wax, the thread will collapse; but, if it be negative, the sealing-wax will make them recede still farther.

A pair of cork or pith balls is used to discover the presence of electricity, and is denominated an electrometer.

Fig. 15 represents a quadrant electrometer, which may be fixed in a hole, Z, of the prime conductor, fig. 14. It consists of a very light rod and pith ball, turning on the centre of a semicircle, B. According to the strength of the electricity, the pith ball flies off, and the scale marks the degree in which the prime conductor is electrified.

If a body containing only its natural share of electricity be brought near a body that is electrified positively or negatively, a part of the electricity, in the form of a spark, will force itself through the air, from the latter to the former. When two bodies, one electrified positively, the other negatively, approach each other, the superabundant electricity rushes violently from one to the other, to restore the equilibrium.

If an animal be placed so as to form part of this circuit, the electricity in passing through it produces a sudden and violent effect, called the electric shock. The motion of electricity in passing from a positive to a negative body is so rapid, that it appears to be instantaneous.

When any part of one side of glass is presented to a body electrified positively or negatively, that side of the glass becomes possessed of the contrary kind of electricity to the side of the body it is presented to, and the other side of the glass is possessed of the same kind of electricity as the other body.

If the knob, O, of the prime conductor, fig. 15, be electrified positively, and a pane of glass be presented to the side next to O, it will be negatively electrified, and the other side will be positively electrified. Electricity communicated to glass does not spread beyond the spot where it is thrown, on account of its non-conducting quality. Electricity may be communicated to the whole surface of glass or any part of it, if it be covered with a metallic substance, as tin-foil. This is called coating the glass.

If a conducting communication be made between both sides of a glass thus coated and charged with electricity, a discharge takes place. Glass of any form, provided it be sound, will answer the purpose, but cylindrical jars are chiefly used. A glass bottle or jar properly coated for electrical purposes is called a Leyden phial, or jar, from the place where this property was discovered.

Fig. 16 represents a Leyden jar, coated with tin-foil on the inside and outside, to within about three inches of the top of its cylindrical part; and having a wire with a round brass knob, or ball, A, at its extremity. This wire passes through the cork or wooden stopple, D: at its lower extremity is a piece of chain that touches the inside coating in several parts. To charge this jar, a communication is made between the electrical machine and the brass knob, A, while the outside of the jar communicates with the earth by the table or the hand.

*Experiment*—1. Bring the knob, A, at the jar near the prime conductor, and after a few turns of the machine the jar will be charged; that is, the inside of the jar will be positively, and the outside negatively electrified; or, if the inside is negatively, the outside will be positively electrified. R is a discharging rod, which is used to convey the superabundant electricity from one side to the other where there is less than the natural share. The discharging rod consists of two knobs, *aa*, attached to wires, which move round a joint X fixed to a glass handle.

2. When one of the knobs is applied to the ball, A, and the other to the outside coating, a communication is made between the outside and inside of the jar, by which the equilibrium is instantly restored by the superabundant electricity passing from one side to the other, appearing in the form of a vivid flash, accompanied with a loud report.

3. A shock may be taken by putting one hand to the outside coating, as at *a*, and bringing the other to the knob, A.

4. Any number of persons may receive the shock together by laying hold of hands, the person at one end bringing his hand near the knob A. If there were a hundred persons so situated, they would every one feel the shock at the same instant. The electric fluid may be conveyed many miles in a moment of time.

Several Leyden jars, connected together by making a communication between all the outsides, and another communication between all their insides, form an electric battery. Electricity, by means of the battery, is capable of producing the most powerful effects. A very slender wire being made part of the circuit, will,

by the discharge of the battery, become instantly red hot. It sometimes melts into small globules of different sizes.

If between two slips of window-glass some gold leaf be placed, and the slips of glass be pressed firmly together, and the shock from the battery sent through them, the gold leaf will be forced into the pores of the glass.

If the gold leaf be put between cards, and a strong charge be passed through them, it will be completely fused. Gunpowder may be fired by the electrical battery.

Metallic points attract the electricity from bodies silently, which renders them useful in defending buildings from lightning.

When electricity enters a point, it appears in the form of a star; when it goes out from a point, it puts on the appearance of a bush.

Instruments may be put in motion by the electric fluid which issues from a point; hence we have electrical orreries, mills, &c.

Lightning is the rapid motion of vast masses of the electric matter. Thunder is the noise produced by the motion of lightning. When the electric fluid passes through highly rarified air, it constitutes the *aurora borealis*, or northern lights. Most of the great convulsions of nature, such as earthquakes, whirlwinds, hurricanes, &c. are generally accompanied with, and dependent upon electrical phenomena.

The atmosphere, when clear, is almost always positively electric; its electricity is stronger in winter than in summer, during the day than in the night. The intensity increases for two or three hours from the time of sunrise, then decreases towards the middle of the day, and again augments as the sun declines, till about the time of sunset, after which it diminishes, and continues feeble during the night. Atmospheric electricity arises from an evolution of the electric fluid during the evaporation that is so abundant at the surface of the earth; and clouds probably owe their existence, or at least their form, to it. The friction of the surfaces of two strata of air moving in different directions, probably developes electricity: and if the strata be of different temperatures, a portion of the vapour they always contain will be deposited; the electricity evolved will be taken up by the vapour, and will cause it to assume the vesicular state constituting a cloud. A vast deal of electricity may be accumulated in this manner, which may either be positive or negative, and should two clouds charged with opposite kinds approach within a certain distance, the thickness of the coating of electricity will increase on the two sides of the clouds that are nearest to one another, and when the accumulation becomes so great as to overcome the coercive pressure of the

atmosphere, a discharge takes place, which occasions a flash of lightning. The actual quantity of electricity in any one part of a cloud is extremely small; the intensity of the flash arises from the very great extent of surface occupied by the electricity, so that the clouds may be compared to enormous Leyden jars, thinly coated with the electric fluid, which only acquires its intensity by its instantaneous condensation.

Among the latest discoveries in natural philosophy are certain singular and important facts which afford grounds for extending the theory of electricity to all those phenomena previously regarded as belonging to the separate science of magnetism. The term electro-magnetism has been adopted to designate this class of phenomena; and that of electro-chemistry has been used with reference to the effect of the electric influence on the chemical composition of bodies; and the manner in which bodies are affected by the irregular distribution of heat, inducing in them or dissipating electricity or magnetism, has been termed thermo-electricity.

## Section IX.—Galvanism.

Galvanism is a peculiar kind of electricity, elicited by the force of chemical action, instead of friction. It is connected with one of the most brilliant periods of British science, from the splendid discoveries to which it led Sir Humphry Davy; but it has acquired additional interest since it has been proved, by the reciprocal action of galvanic and magnetic currents, that magnetism has no existence as a distinct or separate principle, but is only an effect of electricity; therefore, galvanism, as immediately connected with the theory of the earth and planets, forms a part of the physical account of their nature.

The exhibition of phenomena apparently depending on electricity, by the voluntary action of animals, in the case of the torpedo, and some other fishes, which communicate a kind of electric shock to those who touch them, had long been known, when Galvani, professor of anatomy at Bologna, in 1790, observed that the contact of metals with the nerves of a frog recently killed, produced convulsive motions, which might, for some time after the death of the animal, be renewed at pleasure, by repeating the application of the metals. These singular phenomena were at first supposed to depend on some peculiar action of metals on the nerves of animals; and were regarded as constituting the foundation of a new science, to which was appropriated the appellation of Galvanism. However, the important discovery by Professor Volta, of Pavia, of the electric effect of certain

arrangements of different metals, forming what has been since called a voltaic pile, and that of the similarity of the effect of electricity accumulated from bodies excited in the usual manner by friction, with the effect of such a pile, contributed to the introduction of more correct views of the nature of electrical galvanic phenomena.

It has been found that when two metals are brought into contact and then separated, they will exhibit opposite states of electricity. Thus, if an insulated disc of zinc be laid on one of silver or copper, and then removed by means of some non-conducting substance, the zinc, on being applied to a delicate electrometer, will show positive, and the silver or copper, on the other hand, negative electricity. Whence it may be inferred that a portion of electricity had been transferred from the silver or copper to the zinc, and to its passage are to be attributed the convulsions of the muscles of animals when their nerves are in contact with metals arranged in a galvanic circuit. A simple galvanic circle may be formed by the apparatus represented fig. 17, consisting of a plate of zinc, Z, and one of copper, C, immersed to a certain depth in sulphuric acid, greatly diluted with water contained in a glass vessel. Then, when the upper edges of the metals are brought into contact, a current of electricity will take place, the electric fluid circulating from the zinc to the acid, from the acid to the copper, thence again to the zinc, and soon in the direction indicated by the darts. Various modifications of this arrangement may be contrived ; thus, instead of making the metals communicate immediately, as above, a wire of any metal may be attached to the upper extremities of each plate, and when the wires are brought together, the circuit of electricity will go on, but when they are separated it will be interrupted. The effects of such an arrangement as that just described, at least with small metal plates, will be but inconsiderable. Hence Professor Volta conceived the idea of forming what may be termed a compound galvanic or voltaic circle, called the voltaic pile. It consists in arranging a number of discs of different metals, as zinc and copper, with cloth or pasteboard soaked in some acid or saline solution between them ; as thus the effect might be indefinitely augmented, according to the number and size of the discs.

But this instrument was found inconvenient; and therefore has been superseded by the galvanic trough or battery. This may consist of a trough, T, fig. 18, constructed of baked mahogany, with partitions of glass in the interior; or it may be formed of Wedgwood ware, with interior cells, each trough containing ten or twelve. The metal plates, P P, fig. 19, adapted

to them, are united by a bar of baked wood, A B, so that the whole set may be let down into the trough, or lifted out together. The cells are to be filled with water or diluted acid when the instrument is to be used, and the plates being placed in them, each cell will contain a zinc and a copper plate, and the circulation of the electric fluid will take place throughout the whole, while wires proceeding from the last plate on one side, and from the last copper plate on the other, any bodies, by being placed between the wires, will form a part of the circuit, and be subjected to the action of the electric fluid. When the necessary experiments are completed, the plates should be lifted out of the trough, that they may not be too hastily corroded by the acid.

Though the most efficient voltaic circles, whether arranged as piles or troughs, are such as consist of plates of different metals and layers of fluid matter containing oxygen, as already described, yet combinations may be formed of various kinds of matter, besides metals and acids, manifesting analogous effects; though, in most cases, with far inferior energy.

## Section X.—Magnetism.

In order to explain the other methods of exciting electricity, and the recent discoveries that have been made in that science, it is necessary to be acquainted with the general theory of magnetism. It was long since conjectured by some philosophers that a connexion exists between this science and electricity, and that electric and magnetic phenomena arise from the same cause. The power of the natural magnet or loadstone to attract iron was known to the ancients, though they did not avail themselves of it for any useful purpose. The natural magnet or loadstone is an ore of iron, originally found in the country of Magnesia, in Asia, whence it derived its name; but it is by no means uncommon in various parts of the world. The principal varieties are those called by mineralogists natural loadstones, earthy loadstones, and magnetic iron ore, all which are oxides of iron, These bodies, as well as some other iron ores, have long been known to possess the property of attracting metallic iron when brought nearly in contact with it. The magnetic property is capable of being communicated to steel by touching it with a natural magnet; and in this manner artificial magnets are formed for various purposes. The attraction of iron is to be regarded as only one of the peculiar effects of magnetism, but there is another, which, though less imposing and obvious, is highly important; namely, the polarity of magnetic bodies, or that tendency they possess,

when capable of free motion, to assume such a position that one particular part, as one extremity of an iron rod suspended horizontally, shall be directed towards the northern region of the earth, and the opposite extremity towards the southern regions. On this property depends the utility of the mariner's compass, which essentially consists of a magnetic needle suspended on a pivot, so that it may turn horizontally without obstruction.

A magnet at liberty constantly presents the same end towards the north pole, and of course the opposite part towards the south pole of the earth. Those parts so turned towards the earth's poles are called the magnet's north and south poles. The pointing to these poles is called the directive power, and its motion to place itself in that direction is called vibration or traversing. The intensity of magnetism is determined by the number of vibrations which a needle, when brought near a magnet, makes before it fixes.

The magnetic meridian passes through its poles, standing in their natural direction; its declination, or that of the magnetic needle, is the angle the magnetic meridian makes with the meridian of the place. The north or south poles of two magnets repel each other; but the north pole of one attracts the south pole of the other. Place a magnetic needle upon a pin stuck on a table, and, when steady, place upon the table an iron bar eight inches long, and half an inch thick, with one end on one side of the north pole, sufficiently near to draw it a little out of its natural direction. Then bring gradually the north pole of the magnet to the other extremity of the bar, and the needle's north end will recede from the bar, in proportion to the magnet's approach.

Electro-Magnetism.—The connexion of electricity with magnetism had long been indicated by the effect of lightning in magnetizing needles and bars of iron, and by directing experiments with electrical batteries; but accident led to the discovery of the true mode of action. It was not known that the electric current, passing uninterruptedly through a wire connecting the two ends of a galvanic battery, is capable of being manifested by any effect, till Professor Oersted, of Copenhagen, in the winter of 1819, discovered an unequivocal test of its passage in its effect on the magnetic needle. The opposite poles of a battery of sufficient magnitude, in full action, were joined by a metallic wire, which, for shortness, he calls the uniting conductor, or uniting wire. This wire was either placed horizontally, or bent in any other direction required by the nature of the experiment. When the wire was placed horizontally over the parallel to a

magnetic needle properly suspended, and at a distance not exceeding three quarters of an inch, the needle was moved, and the end of it next to the negative pole of the battery turned westwards, the circumstances of the experiment remaining in every respect the same, except that the uniting wire was placed under the needle instead of over it; the declination of the needle was in an opposite direction, for the pole next the negative end of the battery now turned eastwards. Again, when the connecting wire and needle were situated in the same horizontal plane, no declination took place, either in the east or west, but an inclination, or vertical dip of the needle, was observed. When the uniting wire was west of the needle, the pole next to the negative end of the battery was depressed; when the wire was to the east, the same pole was elevated. When the uniting wire was situated perpendicularly to the plane of the magnetic meridian, the needle, whether above or below the wire, remained at rest, unless the pole were very near the wire. In that case, the pole was elevated if the negative electricity entered from the west side; and depressed if from the east.

These, and other experiments of a similar kind, tend to prove that the force emanating from the electric current, which produces such effects on the magnetic needle, acts at right angles to the current, and is therefore unlike any force hitherto known.

The science of electro-magnetism relates to the reciprocal action of electrical and magnetic currents; but there are other branches of science arising out of this, which we can only briefly allude to. M. Ampère, by discovering the mutual action of electrical currents on one another, has added a new branch to the subject, to which he has given the name of electro-dynamics.

From the law of action and reaction being equal and contrary, it might be expected that, as electricity powerfully affects magnets, so, conversely, magnetism ought to produce electrical phenomena. By proving this very important fact from a series of highly interesting and ingenious experiments, Dr. Faraday has added another branch to the science, which he has named magneto-electricity.

M. Arago discovered an entirely new source of magnetism in rotatory motion. If a circular plate of copper be made to revolve immediately above or below a magnetic needle or magnet, suspended in such a manner that the needle may rotate in a plane parallel to that of the copper plate, the magnet tends to follow the circumvolution of the plate; or if the magnet revolves, the plate tends to follow its motion; and so powerful is the effect, that magnets and plates of many pounds' weight have been carried round.

In all the experiments hitherto described, artificial magnets alone were used, but it is obvious that the magnetism of the terrestrial spheroid, which has so powerful an influence on the mariner's compass, must also affect electrical currents. It consequently appears that a piece of copper wire bent into a rectangle, and free to revolve on a vertical axis, arranges itself with its plane at right angles to the magnetic meridian, as soon as a stream of electricity is sent through it. Under the same circumstances a similar rectangle, suspended on a horizontal axis at right angles to the magnetic meridian, assumes the same inclination with the dipping needle. So that terrestrial magnetism has the same influence on electrical currents as an artificial magnet. But the magnetic action of the earth also induces electric currents. When a hollow helix of copper wire, whose extremities are connected with the galvanometer, is placed in the magnetic dip, and suddenly inverted several times, accommodating the motion to the oscillations of the needle, the latter is soon made to vibrate through an arc of 80° or 90°. Hence it is evident, that whatever may be the cause of terrestrial magnetism, it produces currents of electricity, by its direct inductive power, upon a metal not capable of exhibiting any of the ordinary magnetic properties.

# CHAPTER XII.

## NATURAL HISTORY.

NATURAL HISTORY comprises the general description and classical arrangement of all the objects in nature, and in its most extensive meaning includes many of the subjects contained in the last chapter. The variety of natural productions being confessedly very great, it is necessary to find out some means of distinguishing them from each other, and of recognising them anew. These means are the peculiarities, or the assemblages of peculiarities, that exclusively belong to each body. It is only by the combination of several of these properties that we can distinguish an object from others which resemble it in possessing some one or more of those very properties; and the more numerous the species we compare, the more necessary it becomes to bring their properties together, in order to assign to each a character that may distinguish it from the rest. The most obvious general division of the works of nature is that of inorganic and organized bodies; to the former division all minerals, and to the latter, all plants and animals belong.

An inorganic body is any portion of matter, the parts of which would not be changed although they were separated; or, it is a body which may be dissolved, but cannot die, or in the form that it has, cannot have died. When a stone is taken from a quarry, or a fragment broken from a rock, neither the part that is taken away, nor the mass from which it is taken, undergoes the least change; but if a branch be taken from a tree, a limb from an animal, or a wing from a bird, the part so taken soon changes and decays, and the functions of that from which it is taken alter.

An organized body is made up of parts which differ from each other in appearance, situation, nature, and use; it proceeds from some seed or germ that can be obtained nowhere but from a former body of the same species; and it has the faculty of growing, that is, of increasing its own substance by assimilating or changing the nature of other substances.

The inorganic kingdom presents to the naturalist three obvious subdivisions; those of the air, or atmosphere, the water, and the

earth. The natural history of the atmosphere is usually studied in connexion with the truths of natural philosophy. See PNEUMATICS, chap. xi. sect. 4.

The science which explains the phenomena of the water, is also connected with natural philosophy, under the terms Hydraulics and Hydrostatics. See chap. xi. sect. 2, 3.

The history of the materials of which the external surface of the earth is composed (comprehending what is sometimes called the mineral kingdom,) is included under the general terms of Mineralogy and Geology. See chap. xiv.

Organized bodies have been usually subdivided into the animal and vegetable kingdoms. The latter of these forms a separate study, and is comprehended in the chapter on Botany. See chap. xiii.

The history and description of the animal kingdom, (or natural history in its more popular and restricted sense) is termed Zoology, and forms the subject of the present chapter.

## ZOOLOGY.

This branch of natural history, like botany, has been subject to an arrangement into classes, orders, genera, species, &c., which have been distinguished by names borrowed from the Greek and Latin languages. In the classification of animals, the general rule is to take the characters of the class from those qualities of the animals which are the most conspicuous, and at the same time the most important. The most remarkable distinctions in the structure and appearance of animals, consist in having the brain inclosed in a cranium, or skull, and a back-bone, consisting of joints or vertebræ, and being destitute of these. Those that have the back-bone are called vertebral animals, and those that have it not, are called invertebral.

Upon these general distinctions, naturalists have founded their artificial systems of zoology, which are very numerous, and have been subject to continual changes, according to the knowledge, taste, and feeling of the inventors. The system of Linnæus, though in many respects imperfect, is still generally referred to as the basis of all others. The system of Cuvier is considered as founded on a more intimate acquaintance with the anatomical structure of animals, and has been adopted with various modifications, by most scientific inquirers. Yet, as that of Linnæus is better known, and more popular in this country, it is taken with some modifications as the basis of the following classification.

Linnæus divided the animal kingdom into six classes:—1. Such

as suckle their young (*Mammalia*); which includes the whole race of quadrupeds, besides the cetaceous tribes. 2. Birds (*Aves*). 3. Amphibious animals (*Amphibia*), including frogs, tortoises, lizards, and serpents. 4. Fishes (*Pisces*). 5. Insects (*Insecta*). 6. Worms (*Vermes.*)

In the following descriptions we shall endeavour to avail ourselves of the aid afforded by a classical arrangement, and yet, as far as possible, retain the English names.

Where the Latin or Greek names are used, the explanation will be given either immediately or in the connecting sentences. In some cases they are added between parentheses, so that, if required, they may be omitted without destroying the sense.

## Class I.—Mammalia.

Under this class is included nearly the whole race of quadrupeds. Whether we direct our attention to the structure of their bodies, or their various and wonderful instincts, to their ability to render us service, or their power to injure us, we cannot but consider them as prominent and interesting objects of curiosity. The internal conformation in quadrupeds is strikingly analogous to that of man; so that, in some species of the monkey tribe in particular, it requires no small skill in physiology to make the discrimination. Their instincts seem also sometimes to approximate to the reasoning faculty, and to exhibit an appearance of something like the human passions.

The distinguishing marks of quadrupeds of the class of mammalia are, that, like man, they have warm and red blood; their skeleton, as well as their internal organs, resemble, in a great measure, those of the human species. Their outward covering is generally hair, though sometimes they are covered with prickles, and sometimes with scales. Their feet are generally furnished with separate toes or divisions, guarded by claws, more or less strong in the different tribes. In the monkeys the feet have the appearance of hands; and the claws often bear a great resemblance to the human nails. In some tribes of mammalia the feet are armed, or shod with hoofs, either quite entire, or cloven or divided. The teeth are of three kinds: 1. Front or cutting teeth of a broad compressed structure, designed for cutting their food. 2. Sharp, lengthened, or canine teeth, situated on each side of the cutting teeth, and calculated for tearing and dividing the food. 3. Grinders, with broad angular tops, for comminuting or grinding the food; they are situated, as in the human subject, on each side the jaws. The teeth afford a principal character in forming

the tribes and genera, or particular sets of quadrupeds; for in some the canine teeth are wanting; in others, the front teeth; and some few are totally destitute of any teeth. The senses of the mammalia consist, as in man, of the organs of sight, hearing, tasting, and smelling, and the power of feeling.

This class of animals has been variously divided by naturalists into orders, genera, and species. In some systems the characters are taken chiefly from their anatomical structure; in others, more natural and obvious distinctions have been adopted. The number of distinct species is reckoned, by some naturalists, at about three hundred; others have enumerated upwards of four hundred: but in these cases distinctions may be multiplied according to opinion and fancy.

In the system of the celebrated Linnæus this class contains seven orders; the general characters of which must be briefly noticed, with a description of a few of the most interesting examples.

### *Order* 1.—Primates.

This order is called primates, or first, and it is so entitled as containing the chiefs of the creation. The characters are,—four front or cutting teeth, above and below, and one canine, or sharpened tooth, on each side these. The feet are formed with a resemblance of hands, and the nails are more or less oval in shape. Most of the species feed chiefly on vegetable substances.

To this order, besides man, (genus *Homo*,) Linnæus assigns the following genera,—*Simia*, including the ourang-outang, apes, monkeys, and baboons; *Lemur*, the macauco, a genus somewhat resembling the monkey; *Vespertilio*, the bat.

Genus Homo, Man.—In a merely zoological point of view, this stands as the first genus in the Linnæan system. It is thus described:—erect; two handed; prominent chin; teeth of uniform height, in an unbroken series; the lower incisors, or cutting teeth, perpendicular.

Of all the animal creation, the most extraordinary production of the great Author of nature is man. His mental powers, or the use of his reason, distinguish him from all other living creatures; and in him are united the properties both of animal and rational creatures. In its anatomical structure, the human frame does not materially differ from many of the quadrupeds; on this account it has been placed by Linnæus in his first class of animals, under the generic name of *homo*. The bodily powers of man, if taken collectively, are equal to most of the other animals, though there are many individual species which excel him in some particular qualities, as the horse in strength, the stag in swiftness, &c.

Although all mankind are originally descended from one common parent, yet the influence of climate, civilization, and different modes of life, have produced many diversities in the human form, which naturalists have described under several leading and prominent divisions. The varieties of the human species, as arranged by the celebrated comparative anatomist, Blumenbach, are five in number:—

1. *Caucasian variety*, which includes the Europeans (excepting the Laplanders, and the rest of the Finnish race,) the western Asiatics, as far as the river Ob, the Caspian sea, and the Ganges, and the northern Africans.

2. *Mongolian variety*, which includes the rest of the Asiatics (excepting the Malays), the Finnish races of the colder parts of Europe, as the Laplanders, &c. and the tribes of Esquimaux, extending over the northern parts of America, from Bhering's Strait to the extremity of Greenland.

3. *Ethiopian variety* contains the remaining Africans, besides those classed in the first variety.

4. *American variety:* to this belong all the Americans, except the Esquimaux.

5. *Malay variety* includes all the inhabitants of Malacca, of the South Sea, Ladrone, Philippine, Molucca, and Sunda islands. Each variety is distinguished by the colour of the hair, and some striking peculiarities of feature.

Simia, Ape.—The animals of this genus, best known by the familiar name of apes or monkeys, are worthy of particular attention, on account of their near resemblance to the human species. They are a very lively tribe of animals, possess extraordinary powers of imitation, and in general are exceedingly prone to mischief. This genus is usually distributed under three subdivisions, viz. apes, baboons, and monkeys.

Of the apes the most remarkable is the ourang-outang, or wild man of the woods, *(simia satyrus)*; it is of various sizes, from three to seven feet high: its stature is, however, generally less than that of a man, but its strength much greater. It is said they are so powerful in some of the tropical climates, that it would take ten men to secure one of them; and that they will attack the largest elephant with clubs, and compel him to leave that part of the forest which they claim as their own.

Of the baboons, the common baboon, the mandril, and the wanderow have very short tails.

Monkeys differ from the above in having long tails, and some make use of them to coil round any object so as to support themselves in otherwise perilous situations.

Vespertilio, Bat.—In these animals the bones of the extremities are continued into long and thin processes, connected by a most delicately formed membrane or skin, capable, from its thinness, of being contracted at pleasure into innumerable wrinkles, so as to lie in a small space when the animal is at rest, and to be stretched to a very wide extent for occasional flight. There are many species of this genus; but the bat most common in England is about the size of a mouse; and, independent of its wings, very much resembles that little animal.

## *Order* 2.—Bruta.

This order is characterised by a want of front or cutting teeth, both in the upper and lower jaw. The feet are armed with strong claws; their pace is in general somewhat slow, and their food is chiefly vegetable.

The principal genera are, 1. *Bradypus*, the sloth. 2. *Myrmecophaga*, the ant-eater. 3. *Platypus*, the duck-bill. 4. *Manis*, the pangolin. 5. *Dasypus*, the armadillo.

Bradypus, Sloth.—The animals of this genus are so called from their movements being wonderfully slow. There are but three species, two of which are natives of South America, and the third of India. They are generally mild, harmless creatures.

Platypus, Duck-bill.—Of all the mammalia yet known, this seems the most extraordinary in its conformation, exhibiting the perfect resemblance of the beak of a duck ingrafted on the head of a quadruped. The whole animal is thickly covered with a strong but soft and glossy hair, and has four webbed feet, furnished with sharp claws. This dubious quadruped is a native of Australia, or New Holland, and is supposed to feed on worms, water-insects, and weeds.

Dasypus, Armadillo.—The animals of this tribe are called armadillos, from the singular armour by which the upper part of their bodies is defended. This is composed partly of large irregular pieces covering the shoulders and rump, and partly of regular bands lying between these, and folding one over another, like the parts of a lobster's tail, so as to accommodate themselves to all the motions of the animal.

Rhinoceros.—Except the elephant, this is the largest of all terrestrial animals, and in strength and power it is exceeded by none. It is generally about ten or twelve feet long, and nearly as many in the circumference of its body. The horn, which is sometimes three feet long, is used by the rhinoceros both as an offensive

and defensive weapon, by which it is completely armed against the attacks of the most ferocious animals. The rhinoceros is a native both of the continent of Asia, and of several of the islands in the Indian Ocean, especially Ceylon, Java, and Sumatra, and is sometimes found in Ethiopia.

Elephas, Elephant.—The elephant surpasses all our terrestrial animals in size, and in sagacity he is inferior only to man. Like the dog, he is susceptible of gratitude, and capable of attachment; he possesses the most astonishing strength, yet, when tamed, he submits to the will of his master, and is a pattern of fidelity and docility. Elephants have been seen fifteen feet high: their colour is an ash grey; and they have a trunk which they can shorten or lengthen, and with which they are able to pick up money from the ground, untie knots, and perform many things equally curious to the beholder.

### *Order* 3.—Feræ.

This order contains the animals of prey, and consists of several genera, all agreeing in having teeth evidently calculated for feeding on flesh.

The genera of this order are,—*Canis*, including the dog, wolf, hyæna, fox, and jackal; *Felis*, the cat, lion, tiger, leopard, lynx, panther, &c.; *Viverra*, the weasel, ferret, polecat, civet &c.; *Ursus*, the bear, badger, &c.; *Didelphis*, the opossum; *Macropus*, the kangaroo; *Talpa*, the mole; and *Erinaceus*, the hedgehog.

Canis.—The common Dog (*canis familiaris*) is, except the elephant, the most intelligent of all quadrupeds, and on no one can we depend for equal fidelity and attachment. He is obedient and attentive, and performs whatever he is ordered to do with alacrity. There are many kinds of dogs, but they all retain such a similarity, that it is perfectly easy to distinguish them from any other species. The principal are the bull-dog, the mastiff, the Newfoundland, the pointer, the greyhound, the spaniel, the hound, the shepherd's dog, the lap-dog, the terrier, &c.

In appearance the Wolf (*canis lupus*) very much resembles the dog, but in disposition no two animals can be more dissimilar, nor can any have a more decided antipathy to each other. The wolf is very ravenous and insatiable. He will not only attack beasts, but men, when pressed with hunger; and if he finds himself too weak for a large animal, the female accompanies him.

The artful disposition of the Fox (*canis vulpes*) is well known, and he finds it a much easier method to provide himself with food by stratagem, than by encountering danger. He always makes choice of his abode near villages, where he can readily visit the

farm yards, and feast on poultry; and as he carries on his depredations in the night, he frequently kills and hides several fowls or geese more than he wants at that time, and fetches them away at another opportunity.

The Jackall *(canis aureus)* very much resembles both the fox and wolf in make; its colour is yellow, and on that account it has sometimes been called the golden wolf.

The Hyæna *(canis hyæna)* is a most furious and dangerous beast, and it is exceedingly difficult to tame it, however young it may be taken. It is something like the wolf, but more formidable and courageous; and it will resist the attacks of the tiger with success, and defend itself against the lion.

Felis.—This ferocious tribe is distinguished by their sharp and formidable claws, which are lodged in a sheath, and are capable of being extended or drawn in at pleasure. They lead a solitary and ravenous life, and never unite for mutual defence or support. They are carnivorous, and refuse vegetables, unless extremely pressed by hunger.

The Cat *(felis catus)* is too well known to need a particular description. They are an active, cleanly race; their skin is soft, and their fur is naturally sleek and glossy. Wild cats are to be found in every quarter of the world; they are larger than the domestic ones, and much more formidable; their colour is a yellowish white, streaked with black and grey.

The Lion *(felis leo)* is a species of the cat kind. His figure is noble and dignified, and his voice terrible. The face of the lion seems to indicate majesty, to which his large mane materially contributes; he is styled the king of beasts, for no animal can conquer him. Although he is so amazingly powerful, the lion is too generous in his nature to torture those in his power unnecessarily, and he has been frequently known to protect weaker animals from the fury of such as have pursued them.

The Tiger *(felis tigris)* is one of the fiercest and one of the most beautiful of all quadrupeds; it is about the size of the lion, and is remarkable for the smoothness of its hair, which is of a yellowish brown, and for the jet black stripes with which it is marked. It is a native of various parts both of Asia and Africa.

The Panther has the upper part of the body covered with spots, and the lower part striped.—The Ounce and hunting Leopard are trained for the chase in India and Persia, and their mode of seizing the antelope or other animal, is by creeping along unperceived, till they approach near enough to dart upon their prey. The Leopard is very similar to the three last-mentioned beasts; its skin, however, is more beautiful, but in its nature it is

equally cruel and ferocious.—The skin of the lynx is spotted, but its tail is much shorter than that of the leopard.

Viverra, Weasel.—Animals of the weasel kind are known by the length and slenderness of their bodies. They are in general cruel, voracious, and cowardly.

The common weasel is the smallest of this tribe, and is not more than seven inches long, and an inch and a half in height. It destroys young poultry, sucks eggs, and pursues rats and mice into their holes, where it soon kills them.

The Ermine is rather longer than the weasel. The colour of the body is a light brown, but in the most northern parts of Europe it becomes perfectly white at the approach of winter, at which time its fur is deemed the most valuable of any.

The other animals of this genus are the ferret, the pole-cat, the martin, the sable, the ichneumon, the squash, the skink, the zouille, the genette, the civet, the glutton, and the suricate. The martin and sable have exceedingly fine skins; and on that account they are killed by the hunters of Siberia and other cold countries.

The Otter (genus Mustela of Linnæus, but sometimes considered as belonging to this genus) is about two feet long from the tip of the nose to its tail; the head and nose broad and flat; short neck, long body, and small eyes. It is very expert in catching fish, on which it subsists.

Ursus, Bear.—There are three sorts of bears; the brown bear, the black bear, and the great Greenland, or white bear. The brown bear attacks and preys on other animals, destroying lambs, kids, &c.; the black bear confines itself almost entirely to vegetable food; but the white bear of Greenland is by far the largest, and yet the most timorous. The affection of these animals for their young has been noticed as truly wonderful.

The Badger, a species of the bear genus *(ursus meles)*, is a solitary, stupid animal, that seldom ventures far from its hole. It sleeps the greater part of its time; but when roused by the pursuit of the dogs, makes a very vigorous resistance.

Macropus, Kangaroo.—Of all the animals which the continent of Australasia has presented to our view, the platypus excepted, the kangaroo must be considered as the most extraordinary: its size, conformation, teeth, and other particulars, conspiring to render it a most interesting object to every naturalist. There are two species.—The great kangaroo was first discovered by Captain Cook's people, while at Botany Bay, in New Holland, in 1770. In their native state these animals are said to feed in herds of thirty or forty together, and one is generally observed to be stationed, as if apparently on the watch, at a distance from the rest.—The

lesser kangaroo, or kangaroo rat, is about the size of a rabbit; the tail is long, tapering, hairy; the structure of the hind feet perfectly resembles that of the great kangaroo.

Talpa, Mole.—These animals are formed for perforating the earth in the most expeditious manner. The head is long and provided with very strong muscles, which enable them to raise the earth at pleasure; the snout is much lengthened, and movable; the hands are large, broad, and flat, armed with strong, flat, pointed claws, directed backwards, for throwing the earth behind them; and the fore legs are very short and strong. They have no external ears, and their eyes are very small, and hidden in the fur.

Erinaceus, Hedgehog.—This animal is about six or seven inches long, and is covered with prickles on the head, back, and sides; but the nose, belly, and breast, are clothed with fine soft hair.

## *Order* 4.—Glires.

The principal character of the animals composing this order consists in a pair of very conspicuous, strong, and lengthened teeth, placed close together in the front of both jaws. They have no canine teeth, but are furnished with grinders on each side.

The principal genera are, *Hystrix*, the porcupine; *Castor*, the beaver; *Mus*, the mouse and rat; *Cavia*, the guinea-pig; *Arctomys*, the marmot; *Lepus*, the hare; *Sciurus*, the squirrel; *Myoxus*, the dormouse.

Hystrix.—The Porcupine is a very surprising animal, owing to the quills by which it is covered, and which render it extremely formidable; but it is not true that they can discharge these quills, and inflict wounds at a distance, as some have asserted; they are of great use in defending the porcupine from the attacks of other animals, particularly serpents, to whom it has the most decided enmity; and these creatures never meet without a mortal engagement.

Castor, Beaver.—This animal is easily distinguished from all quadrupeds by the peculiar appearance of its tail, which is of an oval form, nearly flat, and serves as a rudder, to direct its motion in the water. It has membranes between the toes on the hind feet only; the fore feet supply the place of hands, like those of the squirrel; and it is about two feet long and a foot high. In the summer the beavers assemble in great numbers, and construct large habitations, divided into small apartments, on the side of a river, which they do with suprising facility. With their teeth they

cut large pieces of wood, and they fix them in the ground, at a little distance from each other, placing smaller twigs between them; they then fill up the cavities with clay, and cement the whole together by mixing and moistening it with water, which they perform with their tails.

Mus, Mouse.—This genus comprises all the different species of rats and mice. They generally live in holes in the ground, are very swift, and able to climb trees. Their food is chiefly vegetable, which they seek in the night, keeping in their retreats during the day.

Lepus, Hare and Rabbit.—This genus approaches to the next order (*pecora*), and it has been supposed that the common hare ruminates. There is no animal more timid or inoffensive than the hare, yet no one has more persecutors. Dogs, cats, and all the weasel tribe continually annoy it; but man destroys more than all its other foes. The flesh of the hare is much esteemed by us, though the ancient Britons abhorred it. The rabbit resembles the hare, but its ears and hind legs are shorter. The colour of the wild rabbit is a dusky brown above, and whitish on the under parts.

Sciurus, Squirrel.—The animals which compose this genus are remarkable for the liveliness of their disposition, the rapidity of their movements, and the general neatness and elegance of their appearance. The squirrel is smaller than the rabbit, and has a beautiful brushy tail, which it can spread so as to cover the whole body. It is generally seen leaping from one branch of a tree to another, or sitting on its hind legs, and using its fore paws in conveying nuts or acorns to its mouth.

### *Order* 5.—Pecora.

The leading character in this order is the total want of front teeth in the upper jaw. In the lower jaw there are six or eight front teeth; the grinders, or side teeth, are usually pretty numerous, and such of the pecora as are furnished with horns, have no tusks or canine teeth; which, on the contrary, are conspicuous in such as are not furnished with horns. The pecora have the power of rumination. All the animals of this order are hoofed; and in the major part the hoof is divided into two principal parts, with the addition in many of two very small undivided hoofs or processes on each side, or rather behind the principal ones. The whole order, without an exception, feeds entirely on vegetable food.

The genera are, *Camelus*, the camel, dromedary, and lama; *Giraffa*, the giraffe, or cameleopard; *Cervus*, the elk, or deer

# NATURAL HISTORY.

## ZOOLOGY.

*Class 1*, Quadrupeds.

*Fig. 1.*



WILD OX.

*Class 2*, Birds.

*Fig. 2.*



GOLDEN EAGLE.

*Class 3*, Reptiles.

*Fig. 3.*



BOA CONSTRICTOR.

*Class 4*, Fishes.

*Fig. 4.* COD.



*Fig 5.*



SAW FISH.

*Class 5*, Insects.

STAG BEETLE. *Fig. 6.*

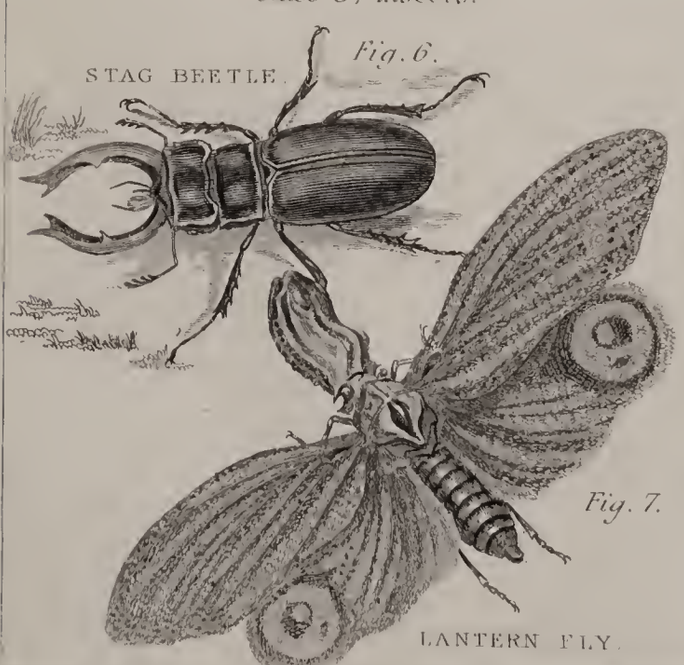


*Fig. 7.*

LANTERN FLY.

*Class 6*, Worms, &c.

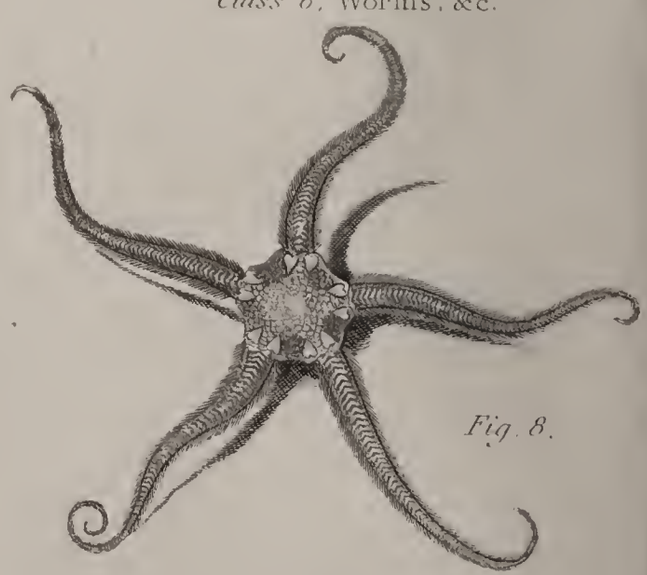


*Fig. 8.*

SEA STAR.

kind; *Bos*, the ox, buffalo, &c.; *Moschus*, the musk; *Antilope*, the antelope, and chamois; *Ovis*, sheep; and *Capra*, goats.

Camelus, Camel.—This is so useful an animal to the Arabians that they are considered sacred by them; and without their assistance those people could neither traffic, travel, nor subsist. In Turkey, Persia, Arabia, and Egypt, commerce is entirely carried on by means of camels, no carriage being so speedy and reasonable in those countries. The Dromedary differs from the camel principally in the circumstance of having but one hump on the back, while the camel has two; and that in size and strength it is not equal to the latter.

Cameleopardalis, Giraffe.—This animal exceeds in height all other quadrupeds, measuring, when full grown, nearly seventeen feet from the top of the head to the fore feet. It is an inhabitant of Africa, and is found chiefly in Ethiopia, and the internal parts of the country, being rarely met with near the coasts. It resides in the forests, where it lives by browsing on the branches of trees. It is only within the last few years that specimens of this magnificent animal have been sent to this country.

Cervus, Deer.—Horns solid, covered while young with a hairy skin, growing from the top, naked, annual branched. Animals belonging to the deer tribe are extremely active and shy; and inhabit woods and sequestered situations. There are, in England, three kinds of deer; the stag, the fallow-deer, and the roe-buck. The other animals comprised in this genus are the elk and rein-deer; the elk is the largest kind of deer, frequently the size of a horse, and inhabits the forests of North America and Asia. The rein-deer is a very useful animal to the Laplander.

Bos, Ox.—Few animals are more widely diffused over the globe than the common ox (*bos taurus*), see Plate *Natural History*, fig. 1. Under different names, distinguishing several varieties, it is found in a wild or domestic state throughout almost the whole of the old continent, in most of the European and Asiatic islands, and is very abundant in several parts of America. It seems capable of enduring equally the rigours of heat and cold, and inhabits the frozen as well as the most scorching climates. In this genus are also the Urus, or wild bull, chiefly found in Lithuania, and prodigiously large; the Bison, which differs from the bull, by having a hump between the shoulders and a long shaggy mane; the Zebu, or the Barbary cow; and the Buffalo, which is an excessively strong and ferocious beast, and furnishes us with very superior kind of leather, justly famed for its thickness, softness, and impenetrability.

Ovis, Sheep.— The common sheep, in its present domestic state, is of all animals the most harmless and inoffensive; and is too well known to require a detail of its habits. There is no part of a sheep but what is in some way advantageous to mankind.

Capra, Goat.—This animal approaches more nearly to the character of the sheep than any other; but it is possessed of a greater share of instinct, and is stronger, swifter, and much more courageous. The goat is lively and playful, and delights in climbing the steepest mountains, for which nature has peculiarly fitted it, by forming the hoof in such a manner, that it can walk as securely on the ridge of a house as on level ground.

### *Order* 6.—Belluæ.

These animals have front teeth in both jaws that are obtuse; their feet are armed with hoofs that are in some species entire, and in others subdivided. Most of them live entirely on vegetable food.

This order comprises the following genera: *Equus*, the horse, ass, zebra; *Hippopotamus; Tapir;* and *Sus*, the hog kind, peccary, babryoussa, &c.

Equus, Horse.—These animals are found wild in several parts of the globe. Large herds of them are occasionally seen in the southern parts of Siberia, in the great Mongolian deserts, and among the Kalkas to the north-west of China. In a domestic state the horse is found in almost every country of the world, except within the Arctic Circle.

When very young, the Ass (*equus asinus*) is sprightly, and tolerably handsome; but he soon loses these qualities, and becomes dull, stupid, and headstrong. In Spain and some other countries they are much more elegant and tractable. Wild asses are fierce, swift, and formidable; and when pursued, will defend themselves with courage.—A Mule is a very hardy and useful animal, and is of a mixed breed, between the horse and the ass, both of which it somewhat resembles. The Zebra is the most beautiful, though the wildest animal in nature. Its head is rather large, its back straight, its legs finely placed, and its tail tufted at the end. Zebras are so very scarce, that they are never seen in this country except in collections of wild beasts.

Hippopotamus.—The head of this animal is of an enormous size, and the mouth extremely wide. The skin is very thick and strong, and of a dusky colour. The length of a male has been found to be seventeen feet, the circumference of the body fifteen, and the height nearly seven. The hippopotamus resides chiefly at the bottom of lakes and rivers, and depends on fish for subsistence, which these animals catch with great celerity.

Sus, Hog.—This genus is allied to the pecora by its cloven hoofs, and to the feræ, in some degree, by its teeth; yet differing widely from both in many respects. The internal structure of the feet also approaches to that of the digitated quadrupeds, while that of some other parts is peculiar to this genus alone. It may, therefore, be allowed to form at once a link between the cloven-footed, the whole-hoofed, and the digitated quadrupeds. The wild boar is, in fact, the hog in a wild state; and the difference observable in them, arises from the long domestication of the tame hog. The wild boar has the head and muzzle larger and stronger than the hog, the tusks longer, and the hair, called bristles, always black; he is very ferocious and unmanageable, and will attack dogs, horses, and even men.

### *Order* 7.—Pinnata.

The pinnated mammalia are those in which the divisions or toes of the feet are connected by webs; enabling the animals, whose principal residence is in the waters, to swim with far greater facility than any other quadrupeds; while, on the contrary, they walk with much greater difficulty.

There are two genera:—*Phoca*, the seal; and *Trichecus*, including the morse or walrus, and the manati or sea-cow.

Phoca, Seal.—This tribe pass much of their time either on the sea shore, on insulated rocks, or on the ice in the frozen seas, assembling in these places in great numbers, especially at the time when the females bring forth their young. The seal has a round head, broad nose, and large sparkling eyes. Seals are caught for the use of their skins, and the oil which their fat yields.

Trichecus, Walrus.—This is a very large animal, growing sometimes to the length of eighteen feet, and so thick as to measure twelve feet about the middle of the body.

The walrus is distinguished from the seal by having two long tusks.

### *Order* 8.—Cete, or Cetacea.

This order comprises the cetaceous mammalia, or whale tribe. These cannot, in strict propriety, be called quadrupeds, since they are only furnished with two feet, which have the appearance of thick fins, while the tail is merely muscular and tendinous; neither are they in any respect like fishes, except in their residence in the water. But since the whole interior structure agrees with that of the mammalia; since they have lungs and breathe; since they

have warm blood, and a heart resembling in conformation that of quadrupeds; and, in particular, since they produce and nourish their young in the same manner; it follows very clearly that they can, with propriety, be ranked in no other class of animals than the Linnæan mammalia.

The genera are, *Balæna*, proper whales; *Physeter*, spermaceti whales; *Delphinus*, the dolphin, porpoise, and grampus; and *Monodon*, the narwhale, sea-unicorn, &c.

Balæna, Whale.—The head is very long, and large in proportion, laterally compressed, and diminishing towards the beak. The jaws are nearly equal, and without teeth; but instead of teeth, the upper jaw is furnished on both sides with horny plates, transversely disposed. The lower jaw is anteriorly of an oval or roundish form, broader than the upper jaw, and having a furrow on the margin for receiving the horny plates. The largest animal of this genus, and indeed in the whole creation, is the great Greenland whale, (*balæna mysticetus.*) It usually measures upwards of sixty feet in length; its fins are from five to eight feet long, and its tail is twenty-four feet broad. The tongue alone produces several hogsheads of blubber. The substance called whalebone is taken from the upper jaw of this stupendous animal.

Physeter, Cachalot, or Spermaceti Whale.—The body is naked, sometimes oval, and sometimes in the form of a lengthened cone. The head is very thick, anteriorly truncated, and occupying nearly one-half or one-third of the whole length of the body. There is only one breathing hole, which is placed on the snout. The jaws are unequal.

Delphinus, the Dolphin.—The body is naked, oval, or of an oblong conical shape, of a blue colour, inclining to black. The head is conical, diminishing gradually towards the snout. The breathing hole, which is on the top of the head, is in form of a crescent, the horns of which are directed towards the snout. This genus comprises the porpoise, the dolphin, and the grampus.

## Class II.—Aves, Birds.

The skeleton or bony frame of birds is, in general, of a lighter nature than in quadrupeds, and is calculated for the purpose of flight. The bones of the wings are similar to those of the four legs in quadrupeds, but the termination is in three joints or fingers only, of which the exterior one is very short.

Birds are divided by Linnæus into six orders:—*Accipitres, Picæ, Passeres, Gallinæ, Grallæ, Anseres.*

## *Order* 1.—Accipitres.

This order consists of birds of prey, feeding entirely on animal food. The bill is more or less curved, strong, and often covered round the base by a naked membrane called a cere; and on each side, towards the tip, is a projection forming a kind of tooth, and serving to tear the prey.

The principal genera are, *Vultur*, the vulture; *Falco*, the falcon, eagle, hawk, and kite; *Strix*, the owl; and *Lanius*, the shrike, or butcher-bird.

Vultur, Vulture.—The birds of this genus are distinguished from eagles and hawks, by being gregarious, by the comparative heaviness of their flight, and by their living on carrion. The aquiline vulture is a large bird of prey, having a naked head and neck, and a black hooked beak. In its appearance it is disgusting, but it is nevertheless of the greatest service to mankind, in those hot countries where it resides, by devouring the remains of animal substances, which would otherwise be left to putrefy.

Falco, Falcon.—This includes the eagle, hawk, and kite. They are distinguished from vultures in several essential respects, besides their general habits already alluded to. The bill in the vulture is longer, and more straight, being only hooked at the apex; in the falcon the curve of the bill commences nearly at the base; the head of the vulture is also bare of feathers, and the neck retractile. Falcons are dispersed throughout the globe. Of this genus the Eagle is the largest and most noble. It is about three feet in length, and the extent of its wings is upwards of seven feet. This bird may justly be styled the king of the feathered race; and, like the lion among quadrupeds, is remarkable for courage and magnanimity. Fig. 2, Plate *Natural History*, represents the golden eagle (*falco crysætus*) one of the largest and most beautiful species. It is three feet and a half long, eight feet across the wings, and weighs about twelve pounds.

Strix, Owl.—The birds of this genus fly abroad by night, and prey on small birds, mice, and rats: their eyes are weak by day, and generally closed. Their sense of hearing is very acute, by means of a particular membrane at the opening of the external ear.

Lanius, Shrike, or Butcher-bird.—The birds of this genus are dipersed throughout most parts of the globe: they are generally of a noisy, restless, and quarrelsome disposition; they prey on all smaller birds as well as insects. After pouncing upon their destined victim, which they usually seize upon in a defenceless state, while young, and in the nest, they bear it away to some

thorny bush, and by the dint of dexterity force it upon one of the stoutest and sharpest spines; after which they proceed to tear the yet living creature into pieces.

### *Order 2.*—Picæ.

Under this order are included all birds of the pie kind. The bill is commonly of a slightly compressed and convex form. Their body is slender, and their voices hoarse; they may be known also by being noisy and chattering.

The principal genera are, *Psittacus,* the parrot kind; *Picus,* the woodpecker; *Paradisea,* birds of paradise; *Alcedo,* the kingfisher; *Cuculus,* the cuckoo; *Trochilus,* the humming-bird; *Corvus,* the crow, raven, jackdaw, magpie, and jay.

Psittacus, Parrot.—This splendid and numerous genus is chiefly confined to the warmer regions of the old and new continents, or within the limits of the tropics; none being natives of Europe. They are remarkable for their active and imitative disposition.

Picus, Woodpecker.—The birds of this genus live principally upon insects, to obtain which they climb trees, and are perpetually in search of those crevices in which their food is lodged. These insects they transfix with their missile and daggered tongue, which is then, by an almost invisible motion, withdrawn wholly into the mouth.

Cuculus, Cuckoo.—The common cuckoo extends throughout most parts of Europe, Asia, and Africa. It comes to us early in the spring, and generally leaves by the end of July; though the females may sometimes remain a little later, till they have deposited all their eggs. They migrate from the north of Europe at the close of summer, and pass the winter in the warmer parts of Africa.

Corvus, Crow.—Most of the species in this genus are found widely dispersed over every part of the globe. They are prolific, social, and very clamorous; building on trees; laying about six eggs; living on grain, seeds, insects, &c.

The Raven is the largest bird of this genus; its plumage is of a bluish black colour, and it is to be found in most European countries, and also in North America.

### *Order 3.*—Passeres.

This order consists of birds of the sparrow kind. The bill is formed so as to operate in the manner of a forceps; their limbs are rather weak; their flight is quick, with a frequent repetition

of the movement of the wings; and they chiefly build in trees or shrubs; they excel in the art of constructing their nests.

The principal genera are, *Columba*, the pigeon; *Turdus*, the thrush, blackbird; *Motacilla*, the nightingale, red-breast, wren, water-wagtail; *Hirundo*, swallows, martins, &c; *Alauda*, the lark; and *Fringilla*, finches, canary-bird, linnet, sparrow, &c.

Columba, Pigeon.—The columbine family are generally of an elegant form, of beautiful varying plumage, and of sociable, gentle, and endearing manners; and are so strictly monogamous, that the first connexion which they form is usually the only one which they contract in the course of their life.

Motacilla, Nightingale.—Though differing considerably in their manners, these birds are ranked by Gmelin under one genus, of which he enumerates nearly two hundred species. Most of these birds feed on insects; a few are gregarious; and in the winter migrate to warmer climates.—The nightingale is a small migratory bird, of a rusty brown colour, generally arriving in this country in the month of April, and leaving it in September, retiring into a warmer climate during winter.

Hirundo, Swallow.—The birds of this genus are readily distinguished, not only by their structure, but by their twittering voice, and their manner of life. They fly with great rapidity, seldom walk, and perform all their functions either on the wing or sitting. By means of their wide mouth they easily catch their food in the air, or on the surface of the water. Naturalists have been much divided in their opinion in regard to their migration; but it is supposed that the far greater number repair to warmer climates in winter.

Alauda, Lark.—There are various species of lark, as the sky-lark, tit-lark, wood-lark, &c.—The sky-lark is the most common in this country, and is usually found in the open and upland cultivated districts in which corn abounds. The nest is placed on the ground, among grass or corn, and is formed of vegetable stalks, and lined with fine dry grass. Sky-larks are easily tamed, and become so familiar as to eat off the table, and even alight on the hand. The lark becomes tuneful early in spring, and continues so during the summer.

Fringilla, Finches.—This numerous and active tribe of birds is very generally dispersed over the world, but they are most common in warm climates.—The chaffinch is rather less than the house-sparrow. The goldfinch is rather less than the chaffinch, being little more than five inches in length, and nine inches in stretch of wing. To this genus also belong the canary bird, linnet, sparrow, &c.

### *Order* 4.—Gallinæ.

This order consists of birds of the poultry kind, including all those which are allied in habit or general appearance, as well as in their mode of life, to the common domestic fowl.

The principal genera are, *Tetrao*, grouse, quail, partridge, &c.; *Meleagris*, the turkey; *Phasianus*, the pheasant, including the common domestic fowl; *Pavo*, the peacock; *Otis*, the bustard; and *Struthio*, the ostrich.

Tetrao.—The grouse chiefly inhabits the colder regions. Partridges and quails are less in size, have a short tail, and their nostrils covered above with a callous prominent margin. They inhabit the temperate and even the warmer climates.

Meleagris, Turkey.—This bird is upwards of three feet and a half long. It inhabits America, and is very generally domesticated in this country. In a wild state it lives in woods, and feeds on nuts, acorns, and insects.

Phasianus, Pheasant.—The females produce many young ones at a brood, and take care of them for some time, leading them abroad, and pointing out food for them. The nests are formed on the ground.

Pavo, Peacock.—Head with a compressed crest; spurs solitary. It would be in vain to attempt to give an adequate description of the beauties of this well known species. Its head is adorned with a tuft of the most exquisite green mixed with gold. But the distinguishing character of this bird is its train, which rises just above the tail, and when erected, forms a fan of the most resplendent hues.

Struthio, Ostrich.—The ostrich is the largest bird, and bears the nearest affinity of any to quadrupeds. It is seven feet high from the top of the head to the ground; and at a distance might be mistaken for a camel. It inhabits the sandy deserts of Arabia; and there is no place, however barren, that is not capable of supplying it with provisions.

### *Order* 5.—Grallæ.

The birds of this order are called waders. The bill is generally rather long, the legs lengthened, and the thighs often bare of feathers above the knee: they frequent rivers and marshy places.

The principal genera are, *Ardea*, the crane, stork, heron, and bittern; *Platalea*, the spoon-bill; *Charadrius*, the snipe and plover tribe; and *Phœnicopterus*, the flamingo.

Ardea, Crane, Stork, &c.—The birds of this numerous genus have long feet and necks, and live on amphibious animals and fishes. They were formerly not uncommon in the fenny districts of England; but they are now seldom seen with us. The common heron is dispersed over most of the countries of the world. It is a great destroyer both of sea and fresh-water fish, being enabled, by the great length of its legs, to wade into some depth of water, where standing motionless till some of the finny tribe approach, it darts its bill into them in an instant.

Phænicopterus, Flamingo.—The birds of this genus combine the characters of the anseres with those of the grallæ. They have the neck and legs long; the bill strong and thick.

### *Order* 6.—Anseres.

This order consists of such birds as have very strongly or conspicuously webbed feet, and are, from their general structure, calculated for swimming. The legs are short, and body stout, and muscular. Their food consists of fish and other water-animals, and frequently of water-plants.

The principal genera are *Larus*, the gull; *Procellaria*, the petrel; *Diomedia*, the albatross, or man-of-war bird; *Pelecanus*, the pelican, cormorant, &c. *Anas*, the swan, duck, goose, &c.; *Aptenodytes*, the penguin.

Larus, Gull.—The birds of this genus are very widely diffused throughout the globe, but the far greater number are natives only of the northern regions of America and Europe. Many of the species inhabit the British isles, residing on our shores the whole year.

Diomedea, Albatross.—This splendid bird is larger than the swan, measuring from three to four feet in length; and its general expansion between the wings, when opened and stretched out, from ten to fifteen feet. Albatrosses are very abundant in many parts without the tropics, both to the north and southward, and are found in every temperate southern latitude as far as those regions have been yet explored. These birds are often caught by means of a hook baited with a fish.

Anas.—This is a very numerous genus, including swans, geese, and ducks. The tame swan is the largest of all British birds, and is distinguished from the wild swan by its being larger, and by the base of the bill being black instead of yellow. They form their nests of grass, and generally among reeds near the water. The eggs are large and white, and six or eight in number.

## Class III.—Amphibia.

This class includes all animals who live with equal facility on land or in water, and some others which do not exactly conform to this description. They are to be distinguished from several of the mammalia, described under Class I., as the seal, beaver, &c. (which have been popularly termed amphibious,) inasmuch as their anatomical structure is totally different. The amphibia, properly so called, which compose this class, have all cold and white blood, instead of warm and red, as is the case with the mammalia. The lungs differ widely in appearance from those of other animals. Many of them are possessed of a higher degree of productive power, and will be furnished with new feet, tails, &c. when by any accident those parts have been destroyed.

The amphibia are divided into reptilia, containing the footed amphibia, as frogs, lizards, &c.; and the serpentes, or footless amphibia, including the whole serpent tribe.

### *Order* 1.—Reptilia.

In the Reptilia there are four genera: *Testudo*, the tortoise, turtle, &c. *Rana*, the frog, toad, &c. *Draco*, the dragon, or flying lizard; and *Lacerta*, lizards, the crocodile, chameleon, newt, salamander, &c.

Testudo, Tortoise.—Some of the species belonging to this genus are natives of the ocean; some are confined to the land, or to fresh water. This introduced a natural division into land and sea tortoises.

The land tortoise is found from one to four or five feet in length, and from five to eighteen inches across the back. The head, which it can at pleasure protrude beyond or draw within the shell, resembles that of the serpent kind. The tail is long and scaly, and the exterior covering of the animal is composed of several pieces of shell joined together in the firmest and most compact manner, and somewhat resembling the tiling of a house.

The sea-tortoise, or turtle, comprehends a variety of species, some of which are neither palatable nor wholesome, while others are celebrated in the annals of epicurism.

The green turtle is that which is held in such high esteem for the table.

Rana, Frog.—This genus has been divided by naturalists into three sections. 1. The ranæ, or frogs, have light active bodies, furnished with strong limbs, performing their motions by leaping. 2. The hylæ, or tree-frogs, have slender limbs, with soft tubercles

on the toes, which enable them to adhere to smooth surfaces, such as the leaves of trees, on which many of them reside. 3. The bufones, or toads, which have large heavy bodies, thick short limbs, and a slow crawling motion. The frog and toad are universally known; and the frequent opportunities which every one has of viewing them, preclude the necessity of description.

The erroneous opinion of toads containing and ejecting poison, has caused many cruelties to be exercised upon this harmless, and, undoubtedly, useful tribe. Toads have been inhumanly treated, merely because they are ugly; and frogs have been abused because they are like them.

Lacerta, Lizard.—The numerous genus lacerta includes a variety of animals which, although they possess many characters in common, yet exhibit considerable differences in structure and external form, as well as in their economy and habits. On this account this genus has been divided by some naturalists into several distinct genera:—1. Crocodiles. 2. Guanas, and other lizards. 3. Cordyles, with denticulated, and sometimes spiny scales. 4. Lizards proper. 5. Chameleons, with granulated skin, large head, long missile tongue, and cylindric tail. 6. Geckos, with granulated or tuberculated skin. 7. Scinks, with smooth, fish-like scales. 8. Salamander, Newts, or Efts. 9. Snake lizards, with extremely long bodies, very short legs, and minute feet. The crocodile is a native both of Africa and America, and frequently grows to the size of twenty feet in length, and five feet in circumference. This fierce and formidable creature spares neither man nor beast.

## *Order 2.*—Serpentes.

The Serpents are generally distinguishable from the rest of the amphibia by their total want of feet. One of the most singular properties of the serpent tribe is that of casting their skin from time to time. When this takes place, so complete is the spoil or coat-skin, that even the external coat of the eyes themselves makes a part of it. Among the poisonous serpents, the fangs or poisonous teeth are furnished with a small hole or slit near the tip. Above the root of each fang is a glandular reservoir of poison, which, in the act of biting, is pressed into the tube of the tooth, and discharged into the wound through the hole near the tip.

The most important genera are, *Crotalus*, the rattlesnake; *Boa*, immense serpents of India and Africa; *Coluber*, the viper, common snake, &c.; *Anguis*, the blindworm.

Crotalus, Rattlesnake.—The animals of this genus inhabit America, where they prey on the smaller birds, lizards, and insects.

The whole genus is furnished with poisonous fangs, placed in two longitudinal rows in the upper part or roof of the mouth. The rattle consists of a number of pieces, inserted into each other, alike in shape and size, hollow, and of a thin, elastic, brittle substance, similar to the exterior part of the scuta.

Boa.—This genus of serpents is very numerous, and contains some species which are remarkable for their huge dimensions. Their immense size has rendered them the objects of terror rather than of observation to mankind; while the quantity of food requisite for their sustenance, has precluded their multiplication within a limited range of country. Taken collectively, they exceed in magnitude all the other tribes of serpents.

Of the boa genus, the *boa constrictor*, (fig. 3, Plate *Natural History*,) is the largest and most terrible; but is not poisonous. It is often thirty feet long, and of a proportionable thickness; its colour is of a dusky white, variously spotted; its scales are round, small and smooth. When it attacks any animal, it raises itself upright on its tail; and there have been many extraordinary facts related of its powers, as the destruction of buffaloes, tigers, &c.

Coluber, Snake, Viper, &c.—The species of this genus are numerous, and diffused over various parts of the world. The poisonous kinds constitute about one-fifth of the whole. The common viper attains to the length of two, or even three feet. The ground colour of the body is a dingy yellow, deeper in the female than the male. It inhabits Europe and Siberia, and is by no means uncommon in Great Britain, being the only poisonous animal in the island.

## Class IV.—Pisces, Fishes.

Like the amphibious animals, the heart of fishes consists of but one chief cavity, and their blood is far less warm than that of quadrupeds and birds. The organs of breathing in fishes are called gills, and consist of a vast number of blood vessels. The generality of fishes are covered with scales, of various forms and size in the different tribes; which scales are analogous to the hair of quadrupeds, and the feathers of birds. The greater number of fishes are oviparous, producing innumerable soft eggs, usually known by the name of spawn.

In the Linnæan arrangement of fishes, the under or belly fins are termed ventral, and are considered analogous to the feet in quadrupeds; and it is from the presence or absence of these fins that the following divisions are instituted.

## *Order* 1.—Apodes.

This order consists of footless fishes, or those entirely destitute of ventral fins. They approach very near to the amphibia, and some of them even resemble the serpent tribe.

The principal genera are *Muræna*, the eel kind; *Gymnotus*, the electric eel; *Anarrhichas*, the sea-wolf; and *Xiphias*, the sword-fish.

Muræna.—The common eel includes a variety of species. It frequents the fresh waters, the ponds, ditches, and rivers of almost every country. It is a singular fish in regard to many particulars of its natural history, and in some respects bears a great resemblance to the serpent tribe.

Xiphias, Sword-fish.—The head is flattish, and the mouth wide, both jaws terminating in a point, but the upper stretched to a great distance beyond the lower, forming what is called the sword.

## *Order 2.*—Jugulares.

This consists of jugular fishes, or those which have the ventral or belly-fins placed more forward than the pectoral or breast-fins.

The principal genera are *Gadus*, the cod, haddock, whiting, ling, &c.; *Blennius*, the blenny; and *Callionymus*, the dragonet.

Gadus, the Cod.—This is a most extensive genus, including a variety of well-known and useful fishes; and is so commonly seen in our markets, that little need be said of it by way of description. The common cod, *gadus morhua*, (fig. 4,) measures from two to five feet in length, is of a cinereous colour, with yellowish spots above, and white below. This valuable fish is found in the northern parts of the world in immense shoals, yielding food and wealth to large districts of country. The coasts off Cape Breton, Nova Scotia, New England, and above all, the banks of Newfoundland, are its principal places of resort; in the latter place an extensive fishery is established.

## *Order 3.*—Thoracia.

The thoracic fishes have the ventral fins situated immediately below the pectoral ones. In this order are comprehended upwards of two hundred and twenty species, most of them furnishing a delicious supply to our tables.

The principal genera are *Coryphæna*, the dorado; *Zeus*, the

dory; *Pleuronectes*, the flounder, plaice, dab, holibut, sole, turbot, &c.; *Perca*, perch; *Scomber*, the mackerel, bonito, tunny; and *Mullus*, the mullet.

Coryphæna.—The dorado is an inhabitant of the tropical climates, and at once the most active and the most beautiful of the finny race. It is about six feet long; its back is all over enamelled with spots of a bluish green and silver colour; its tail and fins are of a golden hue.

Scomber, Common Mackerel.—The ordinary length of this fish is from twelve to sixteen inches, though it has sometimes been found of a much greater size. Its elegant shape and beautiful colouring are too well known to need description, and its qualities as an edible fish have been long duly appreciated.

### *Order* 4.—Abdominales.

The fishes of this order have the ventral fins placed below the pectoral ones, and chiefly inhabit fresh water.

The principal genera are, *Exocoetus*, the flying-fish; *Salmo*, the salmon, trout, smelt, char, grayling; *Esox*, the pike; *Clupea*, the herring, sprat, shad; *Cyprinus*, the carp, tench, gold-fish, minnow, &c.

Salmo.—The salmon is a fish that may stand in the first rank in regard to utility. It appears to be chiefly, or perhaps wholly confined to the northern climates, for it is unknown in the Mediterranean, although it is diffused as far north as Greenland, and is also found on the coast of Kamstchatka. Although the salmon inhabits the ocean, it ascends the rivers to deposit its spawn in security, at a great distance from their efflux. These fishes are often taken in the Rhine as high as Basle, and even ascend to the sources of the rapid rivers of Lapland.

Clupea.—The herring is universally known; the high northern latitudes appear to be its native regions; it is there in the greatest abundance, and the tropic ocean which surrounds the pole seems to be the cradle of the species.

### *Order* 5.—Cartilaginei.

The cartilaginous fishes differ from the rest of the fish tribe in having a cartilaginous or sinewy, instead of a bony skeleton, and in being destitute of ribs. They are divided into two parts; first, such as have no gill-cover, as *Petromyzon*, the lamprey; *Raia*, the skate, torpedo, &c.; *Squalus*, the shark, saw-fish, &c.; *Lophius*, the sea-devil and frog-fish; *Calistes*, the file-fish:—second,

such as have a gill-cover; of which the principal genera are, *Accipenser*, the sturgeon; *Ostracion*, the trunk-fish; *Diodon*, the porcupine-fish; and *Syngnathus*, the pipe-fish.

Squalus.—The shark is of all the inhabitants of the deep the fiercest, the most formidable, and the most voracious. It comprises several varieties, and the smallest of the kind are said to prey on fishes very far superior in size. The mouth and throat are enormously capacious, so that it is capable of swallowing a man without difficulty. Its furniture of teeth is still more terrible, and exhibits a most formidable apparatus of destruction.

The saw-fish, *squalus pristis*, (see fig. 5,) is so called from the form of its mouth, which resembles a large-toothed saw.

Accipenser. — The sturgeon constitutes another distinct genus. It is long, pentagonal, and covered with five rows of large bony knobs, one on the back, and two on each side, with a number of fins to promote its velocity in swimming. The sturgeon, when pickled, is well known, and greatly esteemed throughout all Europe.

## Class V.—Insecta, *Insects.*

Insects are distinguished from other animals by their being furnished with several feet, never fewer than six, and sometimes with many more; by their breathing, not through lungs, but by spiracles or breathing holes, situated at certain distances along each side of the body; and lastly, by the head being furnished with a pair of antennæ. or jointed horns, which are extremely various in the different tribes. The first state in which the generality of insects appear is that of an egg. From this is hatched the animal in its second state, in which it is called the caterpillar, or grub. The insect in this state is called the larva, or mask, being a mask or disguise of the animal in its usual form. The larva differs in its appearance according to the tribe to which it belongs. Its next state is that of a chrysalis, or pupa. The pupa at length emerges the complete insect, in its perfect form, from which it can never after change, nor can it receive any further increase of growth.

Insects feed on a variety of substances; there are few things either in the vegetable or animal kingdoms which are not consumed by some species of them. The leaves, flowers, fruit, and even the ligneous parts of vegetables, afford nourishment to a very numerous class; animal bodies, both dead and alive, even man himself, are preyed on by many of them.

Insects are divided into seven orders:—*coleoptera, hemiptera,*

*lepidoptera*, *neuroptera*, *hymenoptera*, *diptera*, and *aptera*. These terms are taken from Greek words descriptive of the construction of the wings.

### *Order* 1.—Coleoptera.

These insects have a hollow, horny case, called elytra, under which the wings are folded, when not in use. In most insects of this class, the elytra cover the abdomen entirely, in others but partially.

Among the genera are, *Scarabæus*, the beetle; *Lucanus*, the stag-beetle; *Coccinella*, the lady-bird; *Lampyris*, the glow-worm; *Meloe*, the Spanish-fly; and *Forficula*, the ear-wig.

Scarabæus, Beetle.—The larvæ or grubs of this genus have six feet, and a body composed of annular segments, furnished with hairs. They live chiefly under ground, or in dung, on which they frequently feed. The Hercules beetle is one of the most remarkable; it measures sometimes five or six inches in length; and from the largeness of the size of all its parts, affords an admirable example of the characters of the genus.

Lucanus, the stag-beetle (see fig. 6,) is the largest coleopterous insect to be met with in England. It feeds on decayed oak. The larva is white and very thick, with head and feet of a rusty colour.

A great number of other genera of coleopterous insects have been described, as inhabiting different parts of England, which are little known, except to the scientific naturalist. Among those which are generally known, and which belong to this order, may be mentioned the lady-bird, (*coccinella*); the diamond-beetle, (*curculio*); the glow-worm, (*lampyris noctiluca*); the blister-fly, (*lytta vesicatoriæ*); and the ear-wig, (*forficula*).

### *Order* 2.—Hemiptera.

This order consists of half-winged insects; the wing-sheaths are tough or leathery at their upper part, and soft or membranaceous at the lower; and the real or under wings are often of great size, and plaited longitudinally in the manner of a fan.

This order includes the following genera:—*Blatta*, the cock-roach; *Gryllus*, the locust and grasshopper; *Fulgora*, the lanthorn-fly; and *Cimex*, the bug, &c.

Gryllus, Cricket.—This genus is so extensive, that it was divided by Linnæus into several sections.—The mole cricket frequents gardens and cultivated grounds, both of Europe and

America, where it burrows below the ground, and is very destructive; eating and destroying the roots of plants.—The house cricket wanders about during the whole night, keeping a continual chirping, especially before rain. Arsenic, or the root of the wild carrot, mixed up into a paste with flour, is sometimes used to poison them; but they are often spared, from an opinion among the vulgar, that their presence in any house is the cause of good fortune.—The Locust (*gryllus migratorius*) is not much unlike our large grasshoppers in form, and is about two inches and a half in length, with a brownish body, blue legs, and wings of a yellowish brown, spotted with black; they are very common in some parts of the East, and at times do incredible mischief by destroying the produce of the fields and gardens.

Fulgora, Lantern-fly, (fig. 7.)—This insect emits a very bright light from the prominent part on its forehead, of which travellers are said to avail themselves; two or three of them, fixed on the end of a stick, affording them sufficient light to prosecute their journey.

Cimex, Bug.—Most bugs have a bad smell; all of them, except the *reduvii*, feed on the juice of plants, and all of them, without exception, on the juices of animals, particularly of the softer insects, which they suck by means of their snout.

### *Order* 3.—Lepidoptera.

This includes the whole tribe of moths and butterflies. The powder or down on the wings of these insects has been considered as composed of a kind of feathers; but in reality it is composed of a kind of very minute scales, which differ in size and form in the different species, as well as on different parts of the same species.

The order has been divided into two extensive genera:—*Papilio*, the butterfly. *Sphinx* and *Phalæna*, moths.

Papilio, the Butterfly.—The larvæ are universally known by the name of caterpillars, and are extremely various in their forms and colours. In consequence of the prodigious number of species of this beautiful tribe, Linnæus has divided the whole into sections, instituted from the habit or general appearance, and from the distribution of the colour of the wings.—The first consists of *Equites*, or *Knights*, which are distinguished by the shape of their upper wings.—The second division consists of *Heliconii*, which have narrow and perfectly entire wings, frequently bare, the upper ones oblong, the under ones very short.—The third, of *Parnasii*, with wings perfectly entire, the upper pair being

rounded.—The fourth, of *Danai*, with wings perfectly entire.—The fifth, of *Nymphales*, with wings notched.—The sixth, or *Plebeii*, which are commonly smaller than the preceding kinds.

Phalæna, Moth.—Moths fly abroad only in the evening, have their antennæ composed of many articulations, and commonly pectinated in one or both sexes. They feed chiefly on the nectarious juice of flowers. The larva is active, commonly smooth, and more or less cylindrical, and feeds on the leaves of plants. The pupa remains torpid, is generally cylindrical, sometimes pointed before, sometimes at both ends, and in most instances covered with a follicle.—The silk-worm (*phalæna mori*) is an insect resembling a caterpillar, and produces that ornament of our dress, so much admired, called silk.

## *Order* 4.—Neuroptera.

This order consists of such as have four large wings, furnished with very conspicuous nerves, fibres, or ramifications dispersed over the whole wing.

The principal genera are, *Libellula*, the dragon-fly; *Ephemera*, the may-fly, or trout-fly, &c.

Libellula, Dragon-fly.—This is an extremely ravenous tribe, and are generally seen hovering over stagnant waters.

Ephemera, May-fly.—These short-lived animals are found every where about waters in the summer, and in their perfect state seldom live above a day, during which time they perform all the functions of life.

## *Order* 5.—Hymenoptera.

These insects have four wings, but not fibrous like the former order. They generally possess a sting, or piercer, which in some is innocent; but in others it is calculated for a discharge of a highly acrimonious or poisonous juice, as in wasps and bees.

The principal genera are, *Vespa*, the wasp and hornet; *Apis*, the bee; *Formica*, the ant, &c.

Vespa, Wasp.—These live mostly in numerous societies, constructing curious nests, or combs, generally under ground; they prey upon other insects, especially bees and flies, and devour meal, bread, and fruit.

Apis, Bee.—The females have a pungent sting concealed within the abdomen. The bee is a well-known insect, of a brown colour, and rather hairy body. They live in numerous societies, either in decayed trees, or in habitations prepared for

them, called hives. Each hive contains a single female, called the queen bee; about 1600 males, called drones; and about 20,000 others, long supposed to be of neither sex. Upon the latter, the whole trouble devolves of constructing the combs, and collecting and forming the honey. Of all winged insects none are more wonderful or more beneficial to man than bees. In some countries bees are an object of great attention to the peasant, and their honey and wax are considerable articles of trade. It would, however, be impossible to enter into particulars in this place: we shall therefore only observe that their civil and domestic economy, and their unwearied industry, alike entitle them to our regard and imitation.

### *Order* 6.—Diptera.

This order consists of insects with two wings only, as the whole race of flies strictly so called, as well as gnats, and a great variety of other insects.

The genera are, *Œstrus*, the gad-fly; *Musca*, common flies; *Culex*, gnat, mosquito, &c.; *Hippobosca*, horse-leech, &c.

Musca, Common-fly.—Some of these insects have trunks instead of a mouth; others have that organ armed with teeth; and many have a mouth and a trunk. Each eye of the fly contains in it an assemblage of a vast number of small ones, which some have supposed to have the effect of multiplying the surrounding objects. The larvæ are without feet, composed of several segments, nearly cylindrical, and becoming smaller behind. The pupæ are immovable, and most of them covered with a hard skin. The greater part are oviparous; but some of this genus are viviparous.

Culex, Gnat.—The insects of this genus live on the juices of the larger animals, and are eagerly sought after by poultry, and small birds. They deposit their eggs in clusters on the surface of the water, where they remain for a few days until they are hatched.

### *Order* 7.—Aptera.

The insects of this order are entirely without wings.

The principal genera are, *Termes*, the white ant; *Pediculus*, the louse; *Pulex*, the flea; *Acarus*, the tick, mite, &c.; *Aranea*, spiders; *Scorpio*, the scorpion; *Cancer*, the crab, lobster, crawfish, shrimp, &c.; *Monoculus*, the water-flea; and *Oniscus*, the wood-louse.

Pediculus, Louse.—The insects of this genus live by sucking the juices of animals. The larvæ and pupæ have six feet, and are

active, resembling the perfect insect. The louse which infests the human body, when viewed through a microscope, has such a transparent shell or skin, that we are able to discover more of what passes within its body than in most other living creatures. In the head appear two fine black eyes, with a horn that has five joints, and is surrounded with hairs standing before each eye. When the louse moves its legs, the motion of the muscles which all unite in one oblong dark spot in the middle of the breast, may be distinguished perfectly. But the most surprising of all the sights is the peristaltic motion of the guts, which is continued all the way from the stomach down to the anus.

Pulex, Flea.—This genus lives on the juice and blood of other animals. This familiar insect is to be met with every where. It is covered all over with black and hard scales, which are curiously jointed, and folded over one another, so as to comply with all the nimble motions of the creature.

Aranea, Spider.—The anus is furnished with papillæ, with which the insect spins threads, and forms its web. These insects, through every stage of their existence, prey upon other insects, especially those of the order *Diptera;* they even do not spare those of their own genus or species. From the papillæ at the end of the abdomen they throw out at pleasure a number of fine threads, which they unite in various ways for the purpose of entangling their prey.

The two genera, *cancer* and *monoculus*, are crustaceous, or have a hard shelly covering, and for this reason they have been by the French naturalists considered as an entirely distinct order, under the name of Crustacea. The crabs and lobsters cast their skins annually, the body shrinking before the change, and enabling them easily to draw out their limbs from the shell.

## Class VI.—Vermes, *Worms, &c.*

This class of animals is generally considered as the lowest in the scale of animated being. The simplicity of their form, the humility of their station, and the small degree of sense and motion which most of them possess, render them an object of little attention to mankind in general. Many of these animals cannot be obtained without diving to the bottom of the sea, or braving pain and danger in the pursuit. The *furia infernalis* attacks the searcher in the marshy plains of Bothnia; and the *sepia octopus* stretches forth his gigantic arms, to entangle and drag him to his watery den. Hence the opportunities of examination are often rare; and, owing to the changes which many of the species undergo, it is in

many cases difficult to determine to what species these animals really belong. The Linnæan class *Vermes* has been subdivided by the modern naturalists, particularly those of the French school, into several classes; the *Mollusca*, *Zoophytes*, and *Vermes*, being each made to form a distinct class: to which some have added that of *Crustacea*, already alluded to in the last class.

The Mollusca derive their name from the soft fleshy nature of their body. This order includes those pulpy animals which may either be destitute of an external covering, as the slug; or may be enclosed in one or more shells, as the snail, oyster, &c.

Asterias, Star-fish, or Sea-star, (fig. 8).— These animals constitute one of the most numerous genera of the mollusca. They are very curious in their forms, but are almost all radiated, as stars are usually painted; and some of them, from the minuteness of their rays, make a very beautiful appearance.

The shell-animals are produced from eggs, which in some species are gelatinous, or gluey; and in others, covered with a hard or calcareous shell; and the young animal emerges from the egg with its shell on its back. The most familiar and convincing proof of this may be obtained by observing the hatching of the eggs of the common garden snail, as well as of several of the water snails, which deposit eggs so transparent, that the motions of the young, with the shell on its back, may be very distinctly seen several days before the period of hatching. All the shell animals are of such a constitution as perpetually to secrete or exude from their bodies a viscid moisture, and it is with this, managed according to the exigencies of the animal, that the shell is, throughout life, increased in dimensions, and repaired when accidentally broken in any particular part.

Vermes, or Worms, properly so called.—The major part of worms are the inhabitants of living animal bodies, their introduction into which is one of those inscrutable mysteries which must for ever evade the power of human intellect. They exist in most animals; some kinds in the intestines, and some in the other viscera. There are some of this division which do not inhabit other bodies. The common earth-worm, or dew-worm, has neither bones, brains, eyes, nor feet. It has a number of breathing holes situate along its back, near each ring. Its heart is placed near the head, and may be observed to beat with a very distinct motion. The body is formed of about a hundred and forty small rings, furnished with a set of muscles that enable it to act in a sort of spiral direction; and by this means it is capable, in the

most complete manner, of creeping on the earth, or penetrating into its substance.

The Zoophytes, or plant animals, seem to hold a middle station between animals and vegetables. Most of them, deprived of locomotion, are fixed by stems that take root in the crevices of rocks, among sand, or in other situations.

The Polypes (genus *hydra*) deserve our particular notice. These curious animals are found adhering to the stems of aquatic plants, or to the under surfaces of the leaves. The species are multiplied by vegetation, one or two, or even more young ones, emerging gradually from the sides of the parent animal; and these young are frequently again prolific, so that it is not uncommon to see two or three generations at once in the same polype. But the most curious particular respecting this animal is its multiplication by dissection. It may be cut in every direction, and even into very minute divisions, and not only the parent stock will remain uninjured, but every section will become a perfect animal.

The hard or horny zoophytes are known by the name of Corals, (*corallina*), and are equally of an animal nature with the polype; the whole coral continuing to grow as an animal, and to form by secretion the strong or stony part of the coral, which at once may be considered as its bone and its habitation, and which it has no power of leaving. The Sponges (*spongia*) consist of a ramified mass of capillary tubes, that were long supposed to be the production of a species of worms, which are often found within these cavities—an idea, however, which is now nearly exploded. These animals are certainly the most torpid of all the zoophytes. Some of them, as the common sponge, are of no determinate figure; but others are cup-shaped, tubular, &c.

There is another order of this class, to which Linnæus gave the name of Animalcula Infusoria, and which consists of animalcules found in different liquids, &c. The ancients were totally unacquainted with this class of beings. To them the mite was the utmost bound of animal minuteness; but the moderns, assisted by that powerful instrument, the microscope, have discovered whole tribes of animals, compared with which even mites may be considered as a kind of elephants. A countless swarm of animalcules will always appear in any vegetable infusion, after the space of a few days; as in infusions of hay, beans, wheat, and other substances.

The Vorticella, or wheel animal, is perhaps as extraordinary in its construction, as any which the progress of science has

brought to our notice. This wonderful animalcule is found in rain water that has stood some days in leaden gutters, or in hollows of lead on the tops of houses, or in the slime or sediment left by such water. Its wheel work consists of a couple of semicircular instruments, round the edges of which many little fibrillæ move themselves very briskly, sometimes in a kind of rotation, and sometimes in a trembling or vibrating manner. When in this state it sometimes unfastens its tail, and swims along with a great deal of swiftness, seemingly in pursuit of its prey.

The discovery of animals infinitely minute, under such circumstances, and the constant tendency of certain substances to produce them, may be considered as among the wonders of nature, which will probably remain for ever unexplained. But though we can by no means pretend to account for the appearance of these animalcules, yet we cannot help observing, that our ignorance of the cause of any phenomenon is no argument against its existence. In reasoning on this subject, we ought always to remember, that, however essential the distinction of bodies into great and small may appear to us, they are not so to the Deity, with whom, as Mr. Baker well expresses himself, "a nation is as a world, and a world but as an atom." Were the Deity to exert his power for a little, and give a natural philosopher a view of a quantity of paste filled with eels, from each of whose bodies the light was reflected, as when it passes through a solar microscope; instead of imagining them organic particles, the paste would appear like a little mountain; he would, probably, look upon the whole as a monstrous assemblage of serpents, and be afraid to come near them. Wherever, therefore, we discover beings to appearances endowed with the principle of self-preservation, or whatever else we make the characteristic of animals, neither the smallness of their size, nor the impossibility of our knowing how they came there, ought to cause us to doubt of their being really animated.

# CHAPTER XIII.

## BOTANY.

Botany is that branch of natural science which treats of the natural history and classical arrangement of the vegetable kingdom.

Vegetables are organized bodies supported by air and food, endowed with life, and subject to death, as well as animals. They have, in some instances, spontaneous, though we know not that they have voluntary, motion. They are sensible to the action of nourishment, air, and light, and either thrive or languish, according to the wholesome or hurtful application of these stimulants. This is evident to all who have ever seen a plant growing in a climate, soil, or situation not suitable to it.

The external covering of plants, the epidermis, or cuticle, is commonly transparent and smooth; sometimes it is hairy or downy; and sometimes of so hard a nature that even flint has been detected in its composition. The *equisetum hyemale*, or Dutch rush, serves as a file to polish wood, ivory, and even brass. Under the cuticle is found the cellular integument, which is analogous to the *rete mucosum* of animals; it is, like that, of a pulpy texture, and the seat of colour. It is commonly green in the leaves and stems, and is dependent for its hue on the action of light. When the cellular integument is removed, the bark presents itself, which in plants or branches only one year old, consists of a simple layer. In the branches and stems of trees it consists of as many layers as they are years old. The uses of bark are familiar to us. The Peruvian bark affords "a cooling draught to the fevered lip;' while that of the cinnamon yields a rich cordial; and that which is stripped from the oak is used for the purposes of tanning. Immediately under the bark is situated the wood, which forms the great bulk of trees and shrubs. This also consists of numerous layers, as may be observed in the fir and many other trees, and from these eccentric circles or rings, the age of the tree may be determined. Within the centre of the wood is the medulla or pith, which is a cellular substance, juicy when young, extending from the roots to the summits of the branches. In describing the characters of plants we shall treat of their root, buds, trunk, leaves, props, inflorescence, and fructification.

# BOTANY.

*LINNEAN CLASSES.*

1. Monandria.



JOINTED GLASSWORT.

2. Diandria.



JASMINE.

3. Triandria.



WHEAT.

4. Tetrandria.



TEAZLE.

5. Pentandria.



PRIMROSE.

6. Hexandria.



TULIP.

7. Heptandria.



CHICKWEED.

8. Octandria.



WILLOW HERB.

9. Enneandria.



FLOWERING RUSH.

10. Decandria.



VENUS' FLYTRAP.

11. Dodecandria.



SPIKED LOOSESTRIFE.

12. Icosandria.



PEPPER MYRTLE.

13. Polyandria.



CISTUS.

14. Didynamia.



WHITE NETTLE.

15. Tetradynamia.



WALL FLOWER.

16. Monadelphia.



MUSK MALLOW.

17. Diadelphia.



SWEET PEA.

18. Polyadelphia.



ST. JOHN'S WORT.

19. Syngenesia.



DANDELION.

20. Gynandria.



BEE ORCHIS.

21. Moncecia.



SEDGE.

22. Dioecia.



MISLETOE.

23. Polygamia.



PELLITORY.

24. Cryptogamia.



HORSE TAIL.

## Roots.

Roots are necessary to plants, to fix and hold them in the earth, from which they imbibe nourishment. Roots are either *annual*, or living for one season, as in barley; *biennial*, which survive one winter, and after perfecting their seed perish at the end of the following summer, as wheat; or *perennial*, which remain and produce blossoms for an infinite number of years, as those of trees and shrubs in general. The root consists of two parts, the *caudex* and the *radicula*. The *caudex*, or stump, is the body or knob of the root, from which the trunk and branches ascend, and the fibrous roots descend. The *radicula* is the fibrous part of the root branching from the caudex.

Roots are, 1. *Fibrous*, or consisting entirely of fibres, as in many grasses and herbaceous plants. 2. *Creeping*, or having a subterraneous stem, spreading horizontally in the ground, throwing out numerous fibres, as in mint and couch grass. 3. *Spindle-shaped*, as in the radish and carrot, which produce numerous fibres for the absorption of nutriment. 4. *Stumped*, or apparently bitten off, as the primrose. 5. *Tuberous*, or knobbed, as the potato, which consists of fleshy knobs, connected by common stalks or fibres. 6. *Bulbous*, as in the crocus. 7. *Granulated*, or having a cluster of little bulbs or scales connected by a common fibre, as the saxifrage.

## Buds.

These are, in most instances, guarded by scales, and furnished with gum, or woolliness, as an additional defence. Buds are various in their forms, but very uniform in the same species, or even genus. They enfold the embryo plant.

## Trunk.

The trunk of trees includes the stems or stalks, which are of several kinds. The stem as it advances in growth, is either able to support itself, or twines round other bodies. It is either simple, as in the lily; or branched, as in other plants.

The parts are, 1. *Caulis*, the stem, which bears both leaves and flowers, as the trunks and branches of all trees and shrubs, as well as of many herbaceous plants. 2. *Culmus*, a straw or culm, the peculiar stem of grasses, rushes, and similar plants. 3. *Scapus*, or stalk, springs immediately from the root, bearing flowers and fruit, but not leaves, as in the primrose or cowslip. 4. *Pedunculus*, the flower-stalk, springs from the stems or branches, bearing flowers and fruit, but not leaves. 5. *Petiolus*, the foot-stalk, is applied exclusively to the stalk of a leaf.

## Leaves.

These are generally so formed as to present a large surface to the atmosphere. The nutritious juices, imbibed from the earth and become sap, are carried by appropriate vessels into the substance of the leaves, and these juices are returned from each leaf, not into the wood again, but into the bark. This sap is carried into the leaves for the purpose of being acted upon by air and light, with the assistance of heat and moisture. By all these agents, a most material change is wrought in the component parts of the sap, according to the nature of the secretions which are elaborated, whether resinous, oily, mucilaginous, saccharine, bitter, acid, or alkaline. The green colour of the leaves is almost entirely owing to the action of light. Leaves are subject to a sort of disease by which they become partially spotted or streaked, as with white or yellow, and in this state are termed variegated. The irritable nature of the leaves is very extraordinary. The *mimosa pudica*, or sensitive plant, common in hot houses, when touched by any extraneous body, folds up its leaves one after another, while their foot-stalks droop, as if dying.

## Props.

The supports or props of plants are useful to defend them from enemies or injuries. These are divided into seven kinds: 1. *Stipula*, a leafy appendage to the true leaves or to the stalks, for the most part in pairs. 2. *Bractea*, a leafy appendage to the flower or its stalk, very conspicuous in the lime tree. 3. *Spina*, a thorn, proceeds from the wood itself, as in the wild pear-tree, which loses its thorns by cultivation. 4. *Aculeus*, a prickle, proceeds from the bark only, as in the rose and bramble. 5. *Cirrus*, a tendril or clasper, is a support for weak stems, and enables them to climb rocks, or the trunks of lofty trees. 6. *Glandula*, a gland, is a small tumour, secreting a sweet, resinous, or fragrant liquor, as on the calyx or cup of the moss-rose, and the foot-stalks of passion-flowers. 7. *Pilas*, a hair, which includes all the various kinds of pubescence, bristles, wool, &c., some of which discharge a poison, as in the nettle; causing great irritation whenever they are so touched that their points may wound the skin.

## Inflorescence.

Inflorescence, or the different kinds or modes of flowering, are, 1. *Verticillus*, a whorl, in which the flowers surround the stem in a garland or ring, as in the mint, dead nettle, &c. 2. *Racemus*, a cluster, bears several flowers each on its own

stalk, like a bunch of currants. 3. *Spica*, a spike, is composed of numerous crowded flowers, ranged along an upright common stalk, expanding progressively, as in wheat and barley. 4. *Corymbus*, a corymb, is a flat-topped spike, as in the cabbage and wall-flower. 5. *Fasciculus*, a close bundle of flowers, as in the sweet william. 6. *Capitulum*, a head or tuft, as in the globe amaranthus and thrift. 7. *Umbella*, an umbel, consists of several stalks, called rays, spreading like an umbrella, as in parsley, carrot, and hemlock. 8. *Cyma*, a cyme or stalks, springing from a common centre, afterwards irregularly subdivided, as in the laurustinus and alder. 9. *Paniculus*, panicle, a loose subdivided bunch of flowers, as in the oat. 10. *Thyrsus*, a bunch, is a very dense particle inclining to an oval figure, as in the lilac.

## Fructification.

Under this term are comprehended not only the parts of the fruit, but also those of the flower, which last are indispensable for bringing the former to perfection.

The flower is that temporary and beautiful part of vegetables which is intended for the introduction of the seed. It consists of seven principal parts; namely, the calyx, corolla, stamen, pistil, pericarp or seed-vessel, seed, and receptacle; the four first belong properly to the flower, and the three last to the fruit. These parts of fructification are particularly requisite to be known, as on them the classification of plants, according to the system of Linnæus, is founded.

The *Calyx*, empalement or flower-cup, is the green part which is situated immediately below the blossom. Its chief use is to enclose and protect the other parts of the flower. It sometimes consists of two or more leaves, as the rose, and sometimes tubular, as like the cowslip, &c.

The *Corolla*, blossom, or what is commonly called the flower, is the part which is most beautifully coloured, of the finest texture, and often smells sweet. The leaves which compose the corolla are called petals.

The *Stamens*, which are situated in the centre of the flower, are composed of two parts, one long and thin, by which they are fastened to the bottom of the corolla, called the filament, *a*; the other, thicker, placed at the top of the filament, called the anthera, *b*, which opens when it is ripe, and discharges a yellowish dust, called pollen or farina, from its being like flour.

The *Pistils* commonly appear in the centre of the corolla, from which they rise like so many columns. There are from one

to twelve, or more in each flower. The pistil consists of three parts, the germ, the style, and the stigma.

The *germ* is the pedestal or base of the pistil. Its office is to contain the seeds which are not yet arrived at maturity; the *style* is the pillar or thread, which supports the stigma: and the *stigma* is the highest part of the pistil.

The *Pericarp*, or seed-vessel, is the case or covering of the seed, and is the external part of the germ come to maturity.

The *Seed* of plants is that part of every vegetable which, at a certain state of maturity, is separated from it, and contains the rudiments of a new plant, though the parts are too minute to be discerned by our organs of sight.

The *Receptacle*, or base, is that part which supports and connects the whole together.

There are other terms in regard to flowers which require to be explained. A flower is superior, when the receptacle of the flower is above the germ; it is inferior, when the receptacle is below the germ; it is said to be naked when the calyx is absent; is called complete, when it has both a calyx and corolla; and incomplete, when either of these is deficient.

An aggregate flower is a flower composed of florets standing on foot stalks, attached to a broad receptacle.

An umbellated plant is one which sends out towards the top, from the same point or centre, a number of branches, like the spokes of an umbrella, and bearing flowers on the top, as the carrot, parsnip, and parsley.

The extraordinary number and variety of plants is calculated to embarrass the student in botany. It has, therefore, become expedient to submit them to a scientific arrangement, by which the minutest distinctions may be easily described. For this, as well as the subject of the last chapter, we are indebted to the celebrated Linnæus, whose classification of plants has introduced light and order into a subject which was formerly enveloped in darkness and difficulty.

It is supposed that there are upwards of twenty thousand species of plants which compose the vegetable kingdom; nor will this number appear so very surprising, when we consider that the whole surface of the earth is covered with them. About two thousand of these are natives of Great Britain, of which one half are mosses, and the like.

## Classification.

The system of Linnæus is founded on the number, situation, and proportion of the stamens and pistils, whose uses and structure have been just explained. That celebrated botanist divided the whole vegetable creation into twenty-four classes. These are again divided into orders, which are subdivided into genera or tribes; and the genera into species or individuals.

The characters of the classes are taken from the number, connexion, length, or situation of the stamens. In each of the first twenty classes there are stamens and pistils in the same flower. In the twenty-first class they are in distinct flowers on the same plant; in the twenty-second, in distinct flowers on different plants; in the twenty-third, they are in the same flower as well as in distinct ones; and they are not all to be seen in the twenty-fourth class. The names of the classes are formed from Greek words, and express the characteristics of each class. The first ten classes are named from the Greek numerals, and the word *andria*, which the student must consider as meaning the same as stamens

| CLASSES. | | |
|---|---|---|
| 1 | Monandria | One stamen. |
| 2 | Diandria | Two stamens. |
| 3 | Triandria | Three stamens. |
| 4 | Tetrandria | Four stamens. |
| 5 | Pentandria | Five stamens. |
| 6 | Hexandria | Six stamens. |
| 7 | Heptandria | Seven stamens. |
| 8 | Octandria | Eight stamens. |
| 9 | Enneandria | Nine stamens. |
| 10 | Decandria | Ten stamens. |
| 11 | Dodecandria | Twelve stamens. |
| 12 | Icosandria | Twenty stamens. |
| 13 | Polyandria | Many stamens. |
| 14 | Didynamia | Four stamens, two longer. |
| 15 | Tetradynamia | Six stamens, four longer. |
| 16 | Monadelphia | Filaments united at bottom, but separated at top. |
| 17 | Diadelphia | Filaments in two sets. |
| 18 | Polyadelphia | Filaments in many sets. |
| 19 | Syngenesia | Stamens united by antheræ. |
| 20 | Gynandria | Stamens and pistils together. |
| 21 | Monœcia | Stamens and pistils in separate flowers upon the same plant. |

| CLASSES. | | |
|---|---|---|
| 22 | Dicœcia | Stamens and pistils distinct upon different plants. |
| 23 | Polygamia | Variously situated. |
| 24 | Cryptogamia | Flowers invisible. |

In the above arrangement, the names of the first ten classes are distinguished by the numbers of the stamens; as, for instance, all plants which have only one stamen are of the first class; and those that have only two are of the second; those that have only three are the third, and so on.

The formation of the orders is as ingenious and simple as that of the classes. In the first thirteen classes, the orders are founded wholly on the number of pistils; so that by adding *gynia*, instead of *andria*, to the Greek word signifying the numbers, they will be easily recollected. Where they are not distinguished by the number of pistils, their names are taken from some circumstance relative to the stamens, pistils, or seed, as follows:—

| | |
|---|---|
| Monogynia | One pistil. |
| Digynia | Two pistils. |
| Trigynia | Three pistils. |
| Tetragynia | Four pistils. |
| Pentagynia | Five pistils. |
| Hexagynia | Six pistils. |
| Heptagynia | Seven pistils. |
| Octagynia | Eight pistils. |
| Enneagynia | Nine pistils. |
| Decagynia | Ten pistils. |
| Dodecagynia | Twelve pistils. |
| Polygynia | Many pistils. |

In the fourteenth class there are only two orders, which depend on the presence or absence of the pericarp or seed-vessel. 1. *Gymnospermia*, naked seeds in the bottom of the calyx. 2. *Angiospermia*, seeds enclosed in a pericarp.

The fifteenth class is divided into two orders, which are taken from a difference in the form of the pericarp. 1. *Siliculoso*, seeds enclosed in a silicle, or roundish seed-vessel. 2. *Siliquosa*, seeds enclosed in a silique, or long seed-vessel.

In the classes Monodelphia, Diadelphia, Polyadelphia, and Gynandria, the orders are distinguished by the number of stamens; viz. *Pentandria*, five stamens; *Hexandria*, six stamens, &c.

There are four orders in the nineteenth class, taken from the structure of the flower. 1. *Polygamia Æqualis*, having both stamens and pistils in the same floret. 2. *Polygamia superflua*,

when the flower is composed of two parts, a disk, or central part, and rays or petals projecting outwards. 3. *Polygamia frustranea*, the florets of the centre perfect or united. 4. *Polygamia necessaria*, where the florets in the disk, though apparently perfect, are not really so.

In the classes Gynandria, Monœcia, and Diœsia, the orders are formed from the numbers and other peculiarities of the stamens · as *Monandria*, one stamen; *Diandria*, two stamens, &c.

The twenty-third class, (Polygamia), comprises three orders, namely, *Monœcia*, *Diœcia*, and *Triœcia*. The last class (Cryptogamia) has four orders, *Ferns*, *Mosses*, *Sea-weeds*, and *Funguses*.

## Classes.

The Plate, Botany, contains a specimen from each of the twenty-four classes, to which the reader is especially referred in reading the following description.

## Class I.—Monandria.

Most of the plants belonging to this class are natives of India. the principal, perhaps, is the arrow root (*Maranta arundinacea*), which is so strengthening to an invalid. Turmeric (*Curcuma longa*), is also in Monandria, and is the ingredient that gives the yellow colour to curry powder. Ginger, too (*Zingiber officinale*), is in this class; but the parts of all three plants which we use are merely the roots; arrow-root and turmeric are sent to England in powder, but the roots of the ginger are carefully dug up, dried, and sent here in their natural state.

The jointed glass-wort, or sea-grass (*Salicornia herbacea*), (fig. 1,) has three small flowers on each side of each joint, every one is composed of a square calyx, and has one stamen and one pistil. It is a very poor looking plant; nevertheless, it is most serviceable, being used in the manufacture of soap and glass; for its ashes, when burnt, produce a substance called barilla or soda.

## Class II.—Diandria.

Plants in this class are very numerous, both wild and cultivated. The speedwell (*Veronica beccabunga*) is one among many plants, useful as medicines to the poor cottager. It was formerly much valued as an application to wounds and swellings. It is still eaten

as water-cress in many country places, and considered extremely wholesome when fresh gathered.

The delicate and fragrant jasmine, (*jasminum odoratissimum*); the verbena (*verbena triphylla*), with its sweet smelling leaves; rosemary (*rosmarinus officinalis*); sage (*salvia officinalis*); and the common privet (*ligustrum vulgare*), which we use as a hedge, and which produces berries, that, mixed with different solutions, form red, purple, green, black, and blue dyes, and are used in colouring the figures upon cards,—all belong to Diandria. Olives are the pericarp of a tree in this class; the peasantry in the south of Europe gather them when ripe, and eat them with bread as we do butter; for they contain a great quantity of oil; they are quite black when fully ripe. In that state likewise, they go through a process by which all the oil is drawn from the pulp; it is afterwards clarified, and then put into those little wicker flasks that contain the Florence oil we eat with salads.

Common white jasmine (*jasminum officinale*, fig. 2), is a native of India, but has long been cultivated in Europe. It is chiefly raised against walls, and is interesting not only from the elegance of its foliage, but also from the number of beautiful white flowers with which it is adorned, which exhale a sweet odour, particularly after rain, and in the night.

The botanical characteristics are, stem weak, climbing, round; leaves pinnate; leaflets usually seven, broad, lanceolate, the end one larger and more pointed: corolla white; border sometimes only four—cleft.

## Class III.—Triandria.

This class deserves most attention, from its containing principally in its second order, (DIGYNIA) the various sorts of grasses that grow so abundantly in meadows, hedges, and lawns, serving as food for cattle, and being the "staff of life" to man; for wheat (*triticum hybernum*), barley (*hordeum vulgare*), rye (*secali cereale*), and oats (*avena sativa*), are only grasses; not wild with us, but sown in England in great quantities, from the importance attached to them as articles of food. The blossom of grasses, consist first of a calyx, composed of two green husks, one of which is longer than the other; this contains two valves of a thinner texture, within which are the two stamens and the pistils; and in addition to this, some grasses have attached to their corolla a stiff bristly appendage, called the awn, or beard, (*arista*). Many kinds of reeds (*arundo*), and rushes (*scirpus*), belong to this class also; the large bull-rush (*scirpus lacustris*), is an example,

and in tropical countries we have another well known reed, the sugar cane (*saccharum officinarum*), from which all kinds of sugar are prepared. It is a native of China, but extensively cultivated in the West Indies; and the processes which the juice of this reed undergoe before it is converted into sugar are very curious and interesting.

Winter, or common wheat (*triticum hybernum*), is selected in the plate as a specimen (fig. 3.) Common wheat ripens within a year from the time of sowing, although this is accomplished in parts of two years. The following is its classical description: culm jointed, three feet high; dark green smooth leaves; spike long and close, the lower flowers imperfect; the calyx containing generally four flowers; valves of the corolla generally smooth, but in some of the varieties terminated by awns; nectaries small, fringed and silky. Its varieties are white and red lammas wheat, without awns; white and red bearded wheat.

## Class IV.—Tetrandria.

There are three common little plants in this class—the sweet-scented woodruff (*asperula odorata*); the goose-grass (*galium aparine*), or cleaver; and the plantain (*plantago*). But the plants most worthy of remark in it are the teasel (*dipsacus fullonum*), and the madder (*rubia tinctorum*), because they both possess useful qualities. Madder is used in painting; it is the root that affords the fine red dye, from which those paints, brown, red, and purple madders, are prepared; and if cattle eat of this plant, it possesses the peculiar property of tinting their milk, and even their bones, of a bright scarlet. The holly (*ilex aquifolium*) also belongs to this class. It is an *evergreen*, and its wood, which is particularly valuable to turners, from being so extremely hard and fine-grained, is sometimes termed English ebony, because it not only takes a black dye freely, but afterwards admits of a high polish.

The teasel (*dipsacus fullonum*), is cultivated in several parts of England, and used in the carding of woollen cloths. It is distinguished from other plants of the same tribe, by having its leaves connected at the base, and the calyx reflexed. *Fig.* 4 represents the wild teasel which is indigenous in England. The botanical characteristics are, entire lanceolate leaves, in opposite pairs; the mid-rib and stem prickly; straight chaff.

## Class V.—Pentandira.

In this class is comprised one-tenth of the vegetable world, and it includes many very agreeable flowers, as the primrose (*primula vulgaris*), cowslip (*primula veris*), &c.

Among others in this class, are the honeysuckle (*lonicera caprifolium*), the periwinkle (*vinca minor*), the sweet-scented violet, (*viola odorata*), from the juice of which the Turks prepare the beverage called sherbet, so often mentioned in Eastern tales; the forget-me-not (*myosotis palustris*), the convolvulus (*convolvulus arvensis*), and mullein (*verbascum blattaria*), the bell-flower (*campanula cærulea*), borage (*borago officinalis*), and buglos (*echium vulgare*), with their bright blue blossoms; the gay scarlet pimpernel (*anagallis arvensis*), the thrift (*statice armeria*), and that most useful of plants, the flax (*linum usitatissimum*), from which linen of every description is made. The tri-coloured yellow, and purple pansy (*viola tricolor*), which name is merely a corruption of the French word pensée, belongs to pentandria; so does the azalea, (*azalea pontica*), the Greek valerian (*polemonium cæruleum*), the Canterbury bell (*campanula medium*), gentianella (*gentiana acaulis*), guelder-rose (*viburnum opulus*), auricula (*primula auricula*), and heliotrope (*heliotropium suaveolens*), not forgetting the endless number of polyanthuses, which are merely varieties of the common primrose. The common ivy (*hedera helix*), also, whose bunches of black berries form the chief winter food of the wood-pigeon, thrush, and other large birds, and the potatoe (*solanum tuberosum*), a native of South America, from whence it was introduced into England by the celebrated Sir Walter Raleigh, are of this class.

The parsnip (*pastinaca sativa*), carrot (*daucus carota*), fennel (*anethum fœniculum*), celery (*apium graveolens*), and parsley (*apium petroselinum*), and the elder-tree (*sambucus nigra*), are in this class. Currants (*ribes rubrum*), gooseberries (*ribes uva-crispa*), and grapes (*vitis vinifera*), are pentandrious plants.

The exotic productions include important drugs, such as stramonium (*datura stramonium*), assafœtida (*ferula assafœtida*), Peruvian bark (*cinchona officinalis*), of which the substance called quinine is a preparation; also Cayenne pepper (*capsicum grossum*), besides several dyes, varnishes, and gums, all of great importance in different manufactures, both abroad and at home. The fine elm tree (*ulmus campestris*), which gives its name to the ancient imperial city of Ulm, in Germany; and the teak-tree, (*tectona grandis*), which may be styled the oak of India, from being applied to ship-building and all purposes where durability is re-

quired; are the timber trees in this class; but the production in it best known is the coffee-shrub (*coffea Arabica*), a native of Arabia, and much cultivated both in the East and West Indies.

Tobacco is prepared from the dried leaves of a pentandrious plant, so named from Tobago, one of the Caribbee islands, in America, from whence it was brought to England by Sir Francis Drake, in 1585.

The common primrose (*primula vulgaris*), (see fig. 5,) is thus described:—Root bitten off; scapes upright, round, pale green, having one flower each; leaves obovate oblong, nearly upright, toothed and wrinkled, rolled back at the edges, their footstalks of a reddish colour; corolla pale sulphur colour; mouth with a faint rim round it.

## Class VI.—Hexandria.

Our gardens receive many of their most splendid embellishments from flowers of this class. They are principally *exotics*; *i. e.* belonging to other countries, and not *indigenous*, or growing naturally in our own. The common white lily (*lilium candidum*), as well as the orange lily and the spotted lily, belong to the same tribe, with many others equally beautiful, and they all possess such a natural resemblance in their general structure, that they are termed liliaceous plants, and form one of the principal features in the sixth class; the crown imperial (*frittillaria imperialis*), the pretty chequered frittillaria (*frittillaria meleagris*), and all the varieties of tulip (*tulipa*), as well as the sweet-smelling hyacinth (*hyacinthus*), equally belong to it, and are most of them natives of the Levant and different parts of Asia. The onion (*allium cepa*), a very useful vegetable, is in hexandria; so likewise are garlic, (*allium ampeloprasum*), leeks (*allium porrum*), and chives (*allium schœnoprasum*), all of one family, and remarkable for their strong unpleasant smell; they are very valuable for culinary purposes, and are eaten with avidity in the south of Europe by the peasantry, both raw and boiled; but especially in Spain and Portugal, where the onion acquires a milder and finer flavour than in most other countries. One kind of onion is a very common weed in woods and hedges; it is called ramsons, and if cows eat of it, it gives their milk and butter a most unpleasant taste, like garlic.

Fig 6 represents the common garden tulip (*tulipa gesneriana*). The botanical characteristics are a smooth stem, about a foot high, bending a little, bearing one large upright flower; corolla with ovate blunt petals, which in a wild state are red, with a black base; anthers dark coloured.

## Class VII.—Heptandria.

We are now come to the smallest of all the classes, for heptandria contains even fewer specimens than monandria; for it possesses but one native example, and that, though occasionally met with in quite the northern counties of England, is generally considered a Scottish plant, for it grows most luxuriantly and plentifully all over Scotland, where the inhabitants are not a little proud of possessing the only British specimen in heptandria, and one, too, which is celebrated from having been characterised by Linnæus as "his favourite little plant."

It is called the chickweed winter green (*trientalis Europæa*), and has seven stamens and one pistil, (fig. 7.) It is a pretty, delicate plant, with bright green leaves, a slender stalk, and white star-like flowers; composed of a monopetalous corolla, divided into several narrow segments.

The only other example in heptandria, is the horse chestnut (*æsculus hippocastanum*), which blossoms so beautifully in the spring; its flowers are in large clusters of the purest white, spotted all over with red and yellow; within them are disposed seven stamens and one pistil. Nothing can be more ornamental than this tree for shrubberies and pleasure grounds, as it is often covered with a profusion of flowers long before other trees show signs of budding. It is a native of Mount Pindus in Arcadia; but thrives so well in an English soil, that few trees are more commonly to be met with, or are better known: its wood is applied to various useful purposes, and from its resistance to damp and wet, it is particularly valuable in moist situations.

## Class VIII.—Octandria

Comprises various shrubs, both foreign and native. Among the foreign are the balm of Gilead (*amyris Gileadensis*), which grows in several parts of Abyssinia and Syria; the sugar maple of North America, and the rosewood tree in Jamaica. As a native plant we select the large flowered willow herb (*epilobium hirsutum*, fig. 8), very commonly called "codlins and cream," from its peculiar smell. The calyx consists of four divisions, very pointed; the corolla is composed of four petals, which are of a deep rose colour: the ends of these petals are termed claws, and by them the corolla is united to the receptacle.

## Class IX.—Enneandria

Includes several foreign plants, such as cinnamon (*laurus cinnamomum*), bay (*laurus nobilis*), and camphor (*laurus camphora.*) The rhubarb (*rheum palmatum*), which is a native of Turkey in Asia, and is perhaps the most generally useful of all drugs, must not be confounded with the garden rhubarb (*rheum rhaponticum*), which is quite different from the medical one, though both are members of the same family.

We have only one plant that belongs to this class growing wild in this country; it is the flowering rush (*butomus umbellatus*), or water gladiole, (fig. 9.) It is a remarkably handsome plant; sometimes rising beautifully from the water under which it grows, or spreading its rich pink flowers in stately clusters by the sides of running streams, or the margins of lakes and rivers. Twenty or thirty little stalks rise from a brown shrivelled-looking calyx, each supporting a bright rose-coloured blossom of six petals, three large, and three small. Within this are nine white stamens with brown anthers, and they surround six pistils of the same colour.

## Class X.—Decandria

Includes several trees of foreign growth, as lignum vitæ tree (*guaiacum officinale*), logwood (*hæmatoxylon campechianum*), mahogany (*swietenia mahogani*), and Brazil wood (*cæsalpinia brasiliensis*), all natives of the West Indies. There are also various plants and flowers common in this country.

There is a plant belonging to this class which exhibts a very curious instance of vegetable irritability; it is called the fly-trap of Venus, and is a native of America, (see fig. 10.) At the bottom of the footstalk of this curious plant are several leaves, divided into two lobes at the extremity, having long teeth on the margin like the *antennæ* of insects, and armed with six spines: these lie spread upon the ground round the stem, and are so irritable, that when a fly happens to light upon a leaf, it immediately folds up and crushes it to death.

## Class XI.—Dodecandria

Contains all those plants which have from twelve to nineteen stamens fixed to the receptacle.

This class is the most unsatisfactory of the twenty-four: it

might almost be called the imperfect class, as even the few specimens that belong to it vary very much according to the soil.

The plant we have selected (fig. 11,) as our example, is very handsome; it is called the purple-spiked loose-strife (*lythrum salicaria*), and grows abundantly by the sides of rivers, and in marshy places. The flowers are in whorls, on long spikes; not only do they differ as to the number of stamens, but many are altogether imperfect. The corolla consists of six petals; and the colour is very fine, sometimes purple, at others bright lilac.

## Class XII.—Icosandria

Is known by having twenty or more stamens fixed to the inside of the calyx. To this class belong a great variety of fruit trees, such as the apple, (*pyrus malus*), cherry (*prunus cerasus*), pear (*pyrus communis*), plum (*prunus domesticus*), raspberry (*rubus Idæus*), nectarine and peach (*amygdalus Persica.*) Also various shrubs and herbs, such as roses, strawberries, raspberries, &c.

*Myrtus pimenta*, the pimento, Jamaica-pepper myrtle, or alspice (fig. 12), grows upon the mountains, and can hardly be cultivated. There are two genera, which contain a great number of species, and are at the same time very numerous. It is a tree thirty feet high, with a straight trunk, and smooth brown bark; leaves resembling those of the bay tree, but larger; greenish flowers in large bunches; berries spherical, crowned with a calyx; they are chiefly imported into England from Jamaica, whence the name of Jamaica pepper.

## Class XIII.—Polyandria

Comprehends those plants that have more than twenty stamens attached to the receptacle, as the poppy (*papaver*), and tea tree (*thea*), &c.

The Spanish gum cistus (*cistus ladaniferus*, fig. 13), has smooth branches covered with a reddish brown bark. The leaves are narrow, lanceolate, green above, white underneath; corolla, pistils large, roundish, white, with a large purple spot at their base. The whole plant exudes a sweet glutinous substance, which has a strong balsamic smell.

## Class XIV.—Didynamia

Is distinguished by four stamens in a flower, of which two are longer than the others.

We take as our specimen (fig. 14,) a piece of the common white nettle (*lamium album*); the flowers surround the stem in a ring-like form, and each ring is composed of about eighteen or twenty white flowers. The blossom of these flowers is monopetalous, and gaping or ringent; being divided into two parts at the border, but entire at the base, where it is united into a little round tube, which connects it with the calyx; the upper half of the corolla is arched; and if you turn it back, you will find resting under this arch two pair of stamens rising one above the other, with one pistil; the former fixed to the corolla, the latter springing from the receptacle.

## Class XV.—Tetradynamia

Is known by having six stamens in the flower, four of which are longer than the other two. The plants in this class are all eatable, as the cabbage (*brassica oleracea*), turnip (*brassica rapa*), and watercress (*nasturtium officinale*), &c.

The common wall-flower (*cheiranthus cheiri*, fig. 15), is our best example, because the size of its flower makes each part of the fructification easier for examination. The calyx is composed of four straight pointed leaves, adhering very closely together, until the flower is fully blown, when they fall off; it is deciduous. Two of these leaves enlarge at the bottom, and project as if forced out by some inner substance, which is literally the case, for, within it, at the base of the shorter stamens, are the nectaries, the juice of which is very perceptible by stripping down the calyx. The corolla is composed of four petals, rounded and equal in size, placed exactly opposite each other, and inserted into the receptacle by claws as long as the cup. The stamens are six in number, four long and two short.

## Class XVI.—Monadelphia.

Here the stamens are united by their filaments into one set, forming a case round the lower part of the pistils, but separating at the top. There is none more useful than the cotton plant (*gossypium herbaceum.*) The seed vessels, or cotton pods, contain a soft vegetable down, which envelopes the seeds.

The musk-mallow (*malva moschata*, fig. 16), so called from its peculiar scent, shall serve as our example. The calyx is double, as if it were two cups placed one within the other, the outer consisting of three leaves, narrow, the inner of one leaf with five divisions, larger and broader; the petals are five, of a delicate lilac

or pale rose colour, fleshy towards the claws, where they unite to the tube, which supports the stamens; the latter are very numerous. The receptacle rises through this tube like a little column; and if with a needle you gently slit up this small tube to which the stamens are attached, you will perceive the seeds ranged beautifully in a circle round the base of the receptacle, which is long and supports the pistil; this latter branches at the summit into several bright purple hair-like feathers, corresponding in number to the seeds.

## Class XVII.—Diadelphia.

In this class the corollas are papilionaceous, or like a butterfly, as the blossoms of a pea (*lathyrus*); the stamens are connected by the filaments, but divided into two sets, one of which is thicker, and forms a case round the pistil; the other is smaller, and leans towards the pistil. Many plants well known to us are comprehended in it; such as beans (*vicia faba*), vetches (*vicia sativa,*) clover (*trifolium pratense*), furze (*ulex Europæus,*) &c.

We will take a sweet pea (*lathyrus odoratus*, fig. 17), for our example. The outer or upper petal is called the standard or helmet; it is larger than the others, and covers them before the bud unfolds; it is fixed by a claw to the receptacle. The two sides of the petals are termed wings; they stand on each side of the standard, and are also fixed by claws to the receptacle. The fifth petal encloses the stamens and pistil; it is called the keel, from its fancied resemblance to that part of a boat, being hollow, and protecting the internal fructification from injury. On removing this keel, you perceive the flower contains ten stamens; one parcel behind, consisting of nine, and a single and shorter stamen placed in front, forming the other.

## Class XVIII.—Polyadelphia.

The stamens are here united by their filaments into more than two sets or parcels. Several foreign fruits belong to this class, such as the orange (*citrus aurantium*), the lemon (*citrus limonium*), the citron (*citrus medica*), and the chocolate trees (*theobroma cacao.*)

We possess but one native tribe in Polyadelphia, the St. John's wort (*hypericum*), but it comprises a great many different species. In all the flowers, the stamens appear like the hairy part of little paint brushes.

There are eight varieties of this plant; tustan (*hypericum androsæmum*, fig. 18,) will serve as a very good example for all. The calyx is divided into five leaves, and placed below the germen; the corolla consists of five petals of a bright gold colour; the stamens are very numerous, separated into three distinct parcels, and inserted into the receptacle; which is the distinguishing mark of the third order of this class. Its pistils are three; the pericarp is a pretty round pulpy capsule, containing as many cells as it is supported by styles; this little seed vessel is at first of a bright red, but when perfectly ripe becomes quite black: the leaves too are very red in autumn, and when held up to the sun appear to be full of holes; but these spots are only bladders, containing a quantity of clear balsamic fluid, which was formerly esteemed of great value in medicine, as its name implies; for tustan is merely a corruption of *toutesain*, bestowed on this plant by the French in former times, from their considering its balsam a universal *all-heal*. One species, the perforated St. John's wort (*hypericum perforatum*,) is so called from its leaves containing such large bladders filled with this fluid, that they really appear as if full of holes.

## Class XIX.—Syngenesia

Consists of common flowers, as the dandelion (*leontodon taraxacum*), &c., and they are called compound, because each single flower consists of a collection of little flowers or florets, attached to the same broad receptacle, and contained within one calyx.

The common dandelion (*leontodon taraxacum*, fig. 19), is thus described:—leaves varying from pinnatifid to nearly entire, but notched and toothed; a hollow milky scape, supporting a single yellow flower; the lower scales of the calyx turning back; after flowering, the down assumes a spherical form.

## Class XX.—Gynandria.

In this class, the stamens are attached to the pistil; several well-known field plants, of the orchis tribe, belong to it.

The bee orchis (*ophrys apifera*, fig. 20), is thus described:—a leafy stem about a foot high; alternate, lanceolate, sheathing leaves; the three outer petals lanceolate, expanding, purple, marked with three green nerves; the two inner petals linear, villous, and green; the lip of the nectary large, roundish, purple, mixed with yellow; five lobes, bent inwards, a double variegated yellow spot at the base; the upper lip of the nectary resembling a proboscis.

## Class XXI.—Monœcia

Contains those plants which have flowers of different kinds on the same plant, some bearing pistils, and others stamens only. Among those of native growth may be reckoned the oak (*quercus robur*), birch (*betula alba*), alder (*alnus glutinosa*), and pine (*pinus*), &c. In the list of foreign plants may be noticed the bread-fruit tree (*artocarpus incisa*), the cork tree (*quercus suber*), which is only another species of oak, the castor oil plant (*ricinus communis*), and many others.

*Euphorbia peplus*, common spurge or wart-wort, (fig. 21,) is an example of this class. The genus derived its name from Euphorbus, physician to King John. The leaves are inversely egg-shaped; seeds dotted; root taper; stem erect, mostly branched at the base; leafy. The juice of this and other species are used for destroying warts.

## Class XXII.—Diœcia

Consists of those plants which have stamens on one plant, and pistils on another. There are many varieties of willow to be met with, all of which belong to this class.

The misseltoe (*viscum album*, fig. 22,) is perhaps the most curious of all the native productions in this class: it is what is called a *parasite*, which means, that it grows from, or is attached to, a stronger and larger plant; it fixes itself generally to apple trees, but also grows on the hawthorn, hazel, and maple; it has never been known to grow on the ground, though if its berries are merely rubbed against the bark of trees, they will take root and flourish. The two plants, which separately contain flowers with stamens and pistils, grow opposite to each other; the one withers and dies, the other produces seed, which is contained in a clear round berry of a glutinous nature, by means of which it adheres to the branches or bark of a tree, striking its root into it in a singular manner, and deriving nourishment from the juices of the foster plant to which it has attached itself. It presents a curious appearance, its yellowish green leaves contrasting so strongly with the deeper colour of those that grow by its side, though by this very contrast it helps to ornament the tree to whose support it is indebted for life and existence. The misseltoe was held very sacred by the ancient Britons, and is at the present day used to ornament farm houses at Christmas.

## Class XXIII.—Polygamia.

The twenty-third class comprehends those plants which have at least two and sometimes three kinds of flowers. 1. Some with pistils and stamens in the same flower. 2. Others having stamens only. 3. Or, having flowers with pistils only. There is no production more serviceable than the plantain tree (*musa paradisica*), which is of this kind. The fruit is of a pale yellow colour, and is produced in bunches so large as to weigh about forty pounds.

The wall pellitory (*parietaria officinalis,* fig. 23,) is a specimen of an English plant of this class. It grows abundantly on the churchyard walls. The flowers are minute, and seated in pairs between the stalk and the base of the leaves. It has no petals, but each of the flowers is composed of a cleft calyx, green and sometimes tinged with rose colour. Some of the flowers contain four stamens and a pistil; others no stamens, only a pistil of a bright red colour. It is prized by the farmers from its leaves being destructive to weasels.

## Class XXIV.—Cryptogamia.

This class contains several numerous families of plants, whose flowers and fructification are but imperfectly known. It is divided into the following orders:—1. Miscellaneæ; 2. Filices; 3. Musci; 4. Algæ; 5. Fungi.

The fructification in the *Miscellaneæ* consists of an assemblage of target-shaped substances, on pediles, which form several whorls round the upper part of the cylindric stem of the plant, thus constituting a terminating spike. The horse-tail (*equisetum*), differs materially from the ferns. It derives its name from *equus*, horse; *seta*, hair or bristles; which latter it greatly resembles. Early in the year this singular plant protrudes from the earth a sort of club-shaped head. Within the capsules are contained the obscure part of its fructification, and if when ripe one case is detached and shaken, it will be found to contain a quantity of powder. This is the seed, but all the parts composing the organs which produce it, and which are necessary to the formation of the future plant, are too minute for common microscopes.

One species of horse-tail (*equisetum arvense,* fig. 24), grows commonly in corn fields and sandy districts; another is called the great water horse-tail (*equisetum fluviatile*), and grows by the side of stagnant pools, small streams, and marshy grounds; but their general character is alike, consisting of a roundish hollow stem,

divided into joints, which are surrounded by upright streaked sheaths, notched into a peaked or fringed border. The joints of the stalk rest within these sheaths as if in a cup, and from the base of each sheath proceed rings of bristly leaves. The stalk of the rough horse-tail (*equisetum hyemale*), is imported from Holland for its use in polishing wood, ivory, marble, and brass. It is commonly known by the name of Dutch rushes.

*Filices*, or ferns, have their fructification, in general, dispersed in spots or lines, on the under surface of the leaves; but in some instances it occurs in spikes.

The structure of the *Musci*, or mosses, their modes of increase, and organs of fructification, are not yet so thoroughly understood as to enable us to describe them in a manner perfectly satisfactory. The male flowers are merely anthers, with scarcely any filaments, disposed on an horizontal receptacle, and when ripe discharging a fine elastic powder. The female fertile flowers, or pistils of mosses, are usually in a separate flower from the stamens.

The *Algæ* comprise the lichens and sea-weeds. They scarcely admit of the distinction of root, stem, and leaf; much less are we enabled to describe the parts of the flowers. The genera therefore are distinguished by the situation of what are supposed to be the flowers or seeds, and by the resemblance the whole plant bears to some other known substance.

The *Fungi* includes all productions commonly known by the name of mushrooms, as well as a numerous tribe of similar vegetable bodies. Their seeds are borne either in gills or tubes, or attached to fibres, or to a spongy substance. The generic characters are taken from their external form, or from the disposition of their seeds.

Those stately and beautiful trees, known by the general appellation of *Palms*, were placed by Linnæus in a class appendaged to the other twenty-four, probably because, from the vague information possessed in his time respecting their fructification, he could not decide which would be their proper place in his artificial system. He emphatically terms them "the princes of the vegetable kingdom," and describes them as trees or shrubs with lofty unbranched stems, bearing on their summits garlands of evergreen leaves, called fronds, resembling in figure those of the ferns, and having their spokes of flowers protruded from a spathe or sheath.

# CHAPTER XIV.

## MINERALOGY.

MINERALOGY, in its common acceptation, implies the description and classification of all those inorganic substances termed minerals. In its most extensive sense it includes Geology, which treats of the structural formation and relative position of the rocks or mountain masses of which the earth is composed; and Mineralogy, properly so called, which consists of a minute description of the various mineral substances, and a classical arrangement of them according to their external characters.

### SECTION I.—GEOLOGY.

In examining the rocks and mountain masses, of which the earth appears to be composed, so far as science has disclosed them to our view, we are naturally led to some considerations on the origin of the world, and its primordial state. Yet it is evident that this subject is surrounded with apparently insurmountable difficulties, and that a rational and consistent theory of the earth (as it is called,) can be framed only on principles derived from a very advanced state of the science.

It is only since the researches of the Geological Society (established about the year 1811), that this science has been pursued on any substantial basis. The origin of this society may be traced to a comparatively trivial circumstance. A few individuals met, in consequence of a desire to communicate to each other the result of their observations, and to examine how far the opinions maintained by the writers on geology were in conformity with the facts presented by nature. They likewise hoped, that a new impulse might, through their exertions, be given to this science; and with this view, shortly after their establishment, they drew up and distributed a series of inquiries, calculated in their opinion to excite a greater degree of attention to this important study, than it had yet received in this country; and to serve as a guide to the geological traveller, by pointing out some of the various objects which

it is his province to examine. The encouragement and attention which the association met with, exceeded all expectation. It was soon joined by names of high respectability in the literary world. The commencement of a collection was made, which soon considerably increased, and afforded, by its judicious arrangement, every facility of being consulted. Maps, plans, and sections were liberally contributed by the various members, and soon presented a most valuable store of information, particularly relating to the geology of this country. This store rapidly increased; a library was formed; the transactions of various sittings were regularly noticed; and, in general, a short extract of the papers given in the philosophical journals. This rapid progress was, undoubtedly, owing in a considerable measure to the unremitting and well directed exertions of the society's worthy president, Mr. G. B. Greenough, whose extensive acquaintance with the phenomena of nature, both in Britain and abroad, joined with an unbounded liberality in communicating his knowledge to the lovers of science, most eminently qualified him for the chair.

Since then the science has been materially advanced by the labours of Macculloch, Conybeare, Phillips, Buckland, De la Bêche, Webster, Winch, and several other members of the London Society; Brogniart and Von Buch have revealed many wonders in French, Swiss, and Italian geology; and the two Cuviers, Blainville, Lamarcke, and Defranee, have thrown surprising light on the zoology of fossils.

The proper object of geology is to discover the circumstances under which the beds composing the crust of our earth were formed. With this view it is needful that the various substances should undergo a laborious practical examination. Although the earth is upwards of 4,000 miles to its centre, yet with all the efforts which have been made, it has never been penetrated more than one mile: our knowledge must therefore be very limited. The most careless observer of nature must, however, know that the earth is not a solid mass of an individual substance, but that sand and sandstone, clay and limestone, are universally found in all parts of the world.

From a partial examination of these various deposits, we might be led to suppose that they were indiscriminately situated in relation to each other, but the investigations of miners insensibly led them to trace the super-position of rocks. It was early discovered by these practical geologists, that certain ores were always found in certain rocks, and that certain other rocks accompanied those in which the ores appeared.

The crust of the earth is composed of so many beds, that geo-

logists have been compelled to class them in orders, formations, and sub-formations. A series of beds which appear to have been formed by nearly the same cause, and operated upon subsequently by the same agents, are united by geologists, and called a sub-formation. Several of these sub-formations, when united together, make a formation, and a union of formations an order. Now a sub-formation may in one place contain more beds than in another, or it may be different in mineralogical characters. A rock which is usually found in a certain position, may in particular localities be entirely wanting, or be found in so different a character as to be scarcely recognised. In one situation we may observe a series of rocks to consist of a great variety of beds very different in their mineralogical appearance; but, in another place, the same situation in the general succession of rocks may be occupied by but few beds, and these greatly resembling each other in appearance and constitution.

The greater part of rocks are stratified (that is, arranged in strata, or layers,) and at an angle more or less inclined to the plane of the horizon; but this is not the universal position of stratified beds. Not unfrequently they take a basin shape, as may be seen in many of the coal districts, and in the secondary rocks. The natural position of the unstratified rocks is below all others, but they sometimes intrude themselves among those which, in an undisturbed position, lie above them. We therefore find them in nearly all parts of the series, sometimes intersecting rocks in the form of veins, and at other times super-posing them, as though they had flowed over them in a manner similar to the lavas of the present day. And not unfrequently they have been instrumental in forming mountains of very considerable elevation, from the influence they have exerted upon rocks, tilting the horizontal strata in some instances, and in others so disrupting them as to expose them to the influence of denuding waters.

The lower beds of that portion of the earth's crust with which we are acquainted are destitute of all remains of organized beings or fossils, and are called the primitive or primary rocks, because they are supposed to have been formed before the creation of things that have life. The unstratified rocks are also destitute of fossils, as we might expect, for they are almost unanimously attributed to the action of fire. But, excepting the few stratified beds called primitive, and the unstratified, nearly all others contain organic remains, some of which are of a most remarkable character, and now extinct. It has also been discovered that every fossiliferous formation contains certain organic remains peculiar to itself, wherever it may be found. The value of fossils, therefore,

is immense; it enables us at once to decide upon the relative position of a bed, whatever may be its local situation; and to recognise it as well from a few of its organic remains, as though we had examined the country in which it occurs. It has, therefore, become an object of great importance to geology that the fossils of every bed should be collected. Naturalists have been induced to extend their investigations into the bowels of the earth; a new world has been opened to inquiry; a race of beings, before entirely unknown, have been discovered, and a datum established by which every geological problem may be solved.

The few geological facts at present known and established, are the result of the labours and investigations of many years, but the progress of inquiry has been so slow, that up to this period, there has been no generally received classification of rocks. The first attempt of this kind was made by Werner, about the year 1774. His classification was formed upon the presence or absence of organic remains; for the lower rocks, being destitute of them, were supposed to have existed before the creation of things which had life, and were hence called the primitive or primary class, and those which possessed them, the secondary.

The Wernerian classification was universally used in this country till the publication of "Conybeare's Geology of England and Wales." In this work a new classification was adopted, and the crust of the earth divided into five portions, forming the following classes. 1. The superior, containing the tertiary deposit. 2. The supermedial, containing the chalk, greensand, wealden, oolitic, and red sandstone formations. 3. The medial, containing the coal measures, carboniferous limestone, millstone grit, and old red sandstone formations. 4. The submedial, comprising the transition rocks. 5. The inferior, containing the primitive. A recent arrangement, and that which promises to be more generally received, is that which divides rocks into stratified and unstratified, as follows.

Stratified Rocks.—1. *Alluvian group*, peat-bogs, sands, coral islands, &c.

2. *Diluvian group*, transparent boulders and blocks, gravel, &c.

3. *Supercretaceous group*, upper and lower fresh-water, and marine formations.

4. *Cretaceous group*, chalk, greensand, and wealden rocks.

5. *Oolitic group*, oolites and lias.

6. *Red sandstone group*, red marle and sandstone, magnesian limestone, and red conglomerate.

7. *Carboniferous group*, coal measures, carboniferous limestone, and old red sandstone.

8. *Grauwacke group*, grauwacke and grauwacke slates.
9. *Lowest fossiliferous group*, argillaceous and other slates.
10. *Non-fossiliferous stratified group*, mica slate, gneiss, &c.

Unstratified Rocks.—1. *Volcanic group*, lavas, &c.
2. *Trappean group*, greenstone, basalt, porphyry, amygdaloid, &c.
3. *Serpentine group*, diallage rock and serpentine.
4. *Granitic group*, sienite, granite, &c.

The unstratified rocks are extensively distributed over the globe, and are found in strata of all ages. Near Friedau, in Styria, trachytic conglomerates superpose tertiary deposits; in the north of Ireland, immense veins, or dykes, of basalt traverse the chalk; and in our own country the traps are associated with nearly all formations. The unstratified rocks are usually supposed to have originated from the action of subterranean fire, and hence it is we find them in veins as well as beds. They chiefly consist of the granitic, serpentine, and trappean rocks.

The *Granitic Rocks* are chiefly composed of quartz, felspar, and mica; and two or more of these are necessary. Felspar is generally most abundant, but that mineral, as well as all others which enter into their composition, varies in its proportions, and is sometimes absent. Sienite, which is a variety of granite, differs from that rock in having hornblend as a component part, instead of mica. This rock occurs in Scotland, and in the Malvern hills, but particularly in Charnwood forest.

*Diallage* and *Serpentine* are intimately connected together, and pass into each other. Diallage consists chiefly in diallage and felspar. Serpentine, so called from its peculiarly variegated lustre, resembling a serpent's skin, is a simple mineral substance. Its fracture is either splintery or granular, and has a bright lustrous appearance when first broken. It is not extensively distributed, and in England it is only found at the Lizard Point.

*Trappean Rocks.*—The principal rocks of this class are—claystone and clinkstone, chiefly composed of felspar; greenstone, composed of augite and hornblend; and basalt, consisting of augite and titaniferous iron; but the latter is not definitely described. The simple trappean rocks become porphyritic by the admixture of quartz or felspar. The porphyries are known by the name of their base; thus we have claystone, porphyry, and others.

Sometimes the trappean rocks take a columnar structure; the Giant's Causeway and Fingal's Cave, equally celebrated for their picturesque beauty and their singular geological appearance, are instances.

To obtain an accurate acquaintance with the characters and

superposition of rocks will occupy some time and attention. But all the fundamental principles of the science may be summed up in the four following propositions:—1. The crust of the earth is composed of a series of rocks, some of which are stratified, and some unstratified. 2. The stratified rocks have a regular succession, but are often disturbed by the unstratified, which occur in all parts of the series. 3. Nearly all the stratified rocks, excepting a few which are found at the bottom of the series, contain organic remains. 4. Every bed which contains organic remains has some that are peculiar to it, and by them it may always be distinguished.

## Section II.—Mineralogy.

Minerals, strictly speaking, are those substances which are found in mines, but in a more extended view, the term is meant to characterise that class of inanimate bodies found in or upon the earth, and derived either from animal or vegetable origin. Their general characters may be thus defined: they possess neither life nor motion, nor do they exhibit any phenomena dependent on external organization. They may increase in size, but their growth is exceedingly different from the growth of organic beings. The mineral kingdom is divided into four parts, namely, 1. Earths and Stones. 2. Salts. 3. Combustibles. 4. Metals.

### EARTHS AND STONES.

There are nine simple Earths, to which mineralogists have assigned the following names:—1. Silex. 2. Alumine. 3. Zircon. 4. Glucine. 5. Yttria. 6. Barytes. 7. Strontian. 8. Lime. 9. Magnesia. These nine earths enter, in different proportions, into the composition of our globe; their natural colour is white, and whatever other colours are found in them proceed from inflammable, or metallic substances.

*Silex* is a Latin word signifying *flint*. It is much more abundant than any of the other earths, being the chief ingredient of rocks and sand. It is an essential part of glass, the purest sand being used in the manufacture of that valuable article.

*Alumine* earth is so called from its forming the basis of common alum. In fuller's earth, the presence of alumine may be easily discovered, by its having a smell when breathed on peculiar to all clayey substances. Its weight is twice that of water.

*Zircon*, when pure, is a rough powder, insipid, and not to be dissolved in water.

*Glucine* takes its name from a Greek word, signifying sweet; and forms a soft, light, and white powder, with a sweetish taste.

*Yttria*, when divested of those substances with which it is combined, is a fine white powder, without any smell; and is five times heavier than water.

*Barytes* in its pure state is very heavy, but is never found unmixed with other substances. Like alkalies, it has the property of changing blue vegetable colours into green.

*Strontian* is an earth which has some of the properties of barytes, as it converts blue vegetable colours into green, but is not poisonous.

*Lime*, or calcareous earth, when unmixed with any other substance, is of a white colour, and moderately hard substance, though easily reducible to powder. When put into water it quickly absorbs it, becomes hot, and falls into powder.

*Magnesia* is a very fine light white earth, and is found in various clays, stones, and salts, particularly Epsom salts, which consist of magnesia in union with sulphuric acid.

Stones are divided into hard and soft.

Hard Stones are those which will scratch glass, as gems, &c.

*Gems* are precious stones, for the most part transparent, and have a shining glassy appearance. Their different colours are occasioned by the metals with which they are impregnated. The most valuable of all the species are the diamond, the ruby, the emerald, the sapphire, &c.

The *Diamond* is the hardest of all bodies, and is perfectly transparent, and infinitely more brilliant than crystal.

Soft stones, or those which will not scratch glass.

*Common Clay*, usually classed under this head, is found in nearly every country in the world. The peculiar quality of this substance is to become so hard by heat, that it will even strike fire with steel; and its ductility has rendered it an indispensable article of utility to mankind.

*Clay Slate*, or Roofing Slate, is a kind of stone of foliated texture, and greyish, black, brown, or bluish colour; it breaks into splinters, and does not adhere to the tongue. Vast beds of slate occur in different parts of the world.

*Mica*, Glimmer, or Muscovy Glass, is a mineral substance capable of being divided into elastic leaves so thin as to be quite transparent. It is used in Siberia and Russia to supply the place of windows.

*Basalt* is a coarse-grained, blackish stone, generally found in groups of large columns. The Giant's Causeway on the coast of Antrim, in Ireland, and the Cave of Fingal, in one of the western islands of Scotland, are the most remarkable assemblages of basaltic columns that are known.

*Common Limestone* is harder and heavier than chalk, of a greyish colour, and is found in most countries. It forms nearly the whole mountainous districts of Derbyshire and Shropshire, and in it are found numerous veins of lead ore and other minerals.

Marble is a species of compact close-grained limestone, capable of receiving a high polish.

### SALTS.

*Potash* is an alkaline substance, and exists under the form of salt in vegetable substances, which is obtained by burning them. It is used in many arts and manufactures, as scouring, washing, bleaching, dyeing, glass-making, etc.

*Nitre,* or *Saltpetre,* is found in a state of incrustation on the surface of the earth, in some parts of India, Africa, and Spain. Since the invention of gunpowder, which is chiefly composed of nitre, immense quantities are annually consumed.

*Soda* very much resembles potash, and is used for the same purposes. It is obtained from sea-water, and from the ashes of plants growing on the sea-shore.

*Common Salt*, or muriate of soda, is found in most countries in a solid state, though by far the greatest part is obtained from sea-water.

### COMBUSTIBLES.

*Common Sulphur*, or brimstone, is a yellow, dry, and brittle substance. In burning it yields a suffocating smell, well known under the denomination of sulphureous. In the composition of gunpowder it is used to render the mixture of charcoal and nitre more inflammable.

*Plumbago*, or black lead, is an inflammable mineral, of a dark iron-grey colour, with a strong metallic lustre, which, when handled, is soft and greasy. It is of great use to artists, who, if deprived of black lead, would find great difficulty in making their sketches.

*Naphtha*, or rock oil, is a yellowish or bituminous fluid, of strong odour. Its peculiar property is to burn with great readiness, and on the shores of the Caspian Sea the inhabitants burn it instead of oil in their lamps.

*Petroleum* is a bitumen of greater consistency than naphtha, of black, brown, or greenish colour, which, when exposed to the air, assumes the appearance of tar, and is called mineral tar.

*Coal* is found in beds, or strata, and chiefly occurs in those countries which lie nearly in the same latitudes with Great Britain. The largest coal-field with which we are acquainted is in the south of Wales; it is nearly one hundred square miles in extent, and pro-

ducing on the average the amazing quantity of nearly sixty-four million tons of coal in every square mile. The uses of coal as fuel are too well known to require any observations; and it has lately been employed in producing gas, which is a new invention of the highest importance.

## METALS.

Metals, when found combined with other mineral substances, have the name of ores. They are found deposited in veins, at various depths, in the earth; more generally in mountainous than in plain or level districts. When a vein of any ore is discovered, the surface of the earth is penetrated to it, and the vein is followed in whatever direction it may lie. The hollow places thus formed are called mines, and those who work in them are denominated miners. After the metallic ores are drawn from the mine, they have to undergo several processes before they are fit for use, and are generally first washed in a running water to cleanse them of earthy particles.

The Metals form a most important class of natural bodies. The number of metals known, or presumed to exist, amounts to forty. They are by close analogies connected with each other, and by remote analogies with the inflammable solids.

The present classification of metals includes what were formerly treated as simple earths and alkalies, but which are now found to be oxides of certain metals, and capable of being reduced by the voltaic battery to their metallic state. The earths are lime, magnesia, barytes, strontites, alumine, glucina, zirconia, silica, and yttria; the alkalies are potass, soda, and ammonia, now found among the metals, under analogous names.

The characteristic properties of metals are lustre, opacity, combustibility, and power to conduct electricity. They differ much in their mechanical properties, hardness, ductility, and tenacity; by slow cooling they assume regular crystalline forms, usually cubical or octahedral. Formerly considerable specific gravity was deemed essential to metallic substances; but Sir H. Davy has discovered bodies lighter than even water, which agree in all other essential qualities with metals, and must therefore be arranged with them. The most inflammable metals produce alkalies, alkaline earths, and earths, by combustion. Other metals afford the substances called oxides, analogous to earths; and a few are converted into acids. The metals that produce alkalies are potassium and sodium; the alkaline earths are formed from metals, called barium, strontium, calcium, and magnesium. The metals supposed to be contained in common earths, are silicium, aluminum,

zireonium, yttrium, and glueinum. The metals that produce oxides, and which in eommon language are called metals, are 25 in number, as follow: manganese, zine, tin, iron, lead, antimony, bismuth, tellurium, eobalt, eopper, niekel, uranium, osmium, tungsten, titanium, columbium, cerium, palladium, iridium, rhodium, mereury, silver, gold and platinum.

The metals that produce acids are, arsenic, molybdenum, and chromium.

The eommon metals, by their fusibility, malleability, hardness, and durability, are most important instruments in the arts; their uses are essential to the progress of eivilization; and most of the comforts, and many of the luxuries and refinements of social life, are connected with their application. We have spaee to deseribe only a few of those most in eommon use.

*Tin* is proeured from the native combination of this metal with oxygen, (ealled tin-stones, or oxides of tin,) by ignition with chareoal or carbonaceous substances. The colour of tin is white, resembling that of silver. It is harder than lead, and softer than zinc. Its speeifie gravity is 7·291; it is very malleable, and may be extended into extremely thin leaves.

*Iron* is obtained from various ores, (in which it exists eombined with oxygen,) by intense ignition with earbonaeeous substanees. The purest iron is made from an ore ealled hæmatites, by ignition with eharcoal; and the metal is hammered while soft, and exposed to air, till it beeomes duetile. The speeifie gravity of iron is about 7·7. Its malleability, though eonsiderable, is less than that of gold, silver, and eopper, but its ductility and tenaeity are greater; it may be drawn in extremely fine wire, and a wire of 0·078 of an ineh in diameter will support 549·25 lbs.

*Lead* is ehiefly proeured from eertain ores in which it is eombined with sulphur. The sulphur is expelled by a eontinued heat in a reverberatory furnaee, and the metal is obtained by fusion. Lead is the softest of the eommon metals. It is very malleable, but not very duetile. Its point of fusion is 612°; but an intense heat is required for its evaporation.

*Copper* has a red eolour; is a little harder than silver; its speeifie gravity is about 8·89. It emits, when rubbed, an unpleasant smell, and has a disagreeable taste. It is very malleable, has eonsiderable duetility, and tenaeity superior to all metals except iron; it fuses at a slow, white heat. It burns with a red flame edged with green, when fused and aeted upon by oxygen; when in thin leaves, it inflames spontaneously in chlorine.

*Mercury* is of a brilliant white eolour. Its speeifie gravity is 13·56. At the common temperature of the air it is fluid,

becomes solid at 39° below 0° of Fahrenheit, and boils at about 660°. Mercury is found native in the mines of Idria, Spain, and Peru; and also combined with chlorine and muriatic acid, in which states it forms muriate of mercury (corrosive sublimate) and submuriate of mercury, known under the name of calomel. Mercury is a very important and useful metal. It is employed in extracting gold and silver from their ores; and in the state of amalgam with tin for covering mirrors.

*Silver* is of a brilliant white colour, with great lustre, and without taste or smell. It is softer than copper; its specific gravity is about 10·40, which is slightly increased by hammering. It exceeds all the metals except gold in malleability. Silver is very ductile, and may be easily drawn into extremely fine wire. Its tenacity is considerable. A wire of 0·078 of an inch in diameter will support 187·13lbs weight.

*Gold* is of a fine light yellow colour; its hardness little superior to that of tin. Its specific gravity is about 19·277, which is increased by hammering. In malleability and ductility it exceeds all metals. It has a considerable degree of tenacity; a wire of 0·078 inch in diameter will support a weight of 150lbs. It fuses at about 1300°. Gold forms alloys with the other metals; some of these are brittle, as with bismuth, antimony, and lead; others are malleable, as with silver, copper, and platinum. The alloy of gold and copper is employed in coin.

# CHAPTER XV.

## THE BELLES LETTRES

This term, in its most comprehensive meaning, may be considered as synonymous with polite literature. In this sense the belles lettres properly comprehend those subjects that relate to man as a being endowed with taste and imagination, which were intended to embellish his mind, and to supply him with rational and useful entertainment. They include the origin, structure, and various kinds of language, or grammar; universal and particular criticism; rhetoric in its whole extent of composition, style, and elocution; history in its several departments, ancient and modern, general and special; and all the different kinds of poetry. Their province comprehends every thing that relates to beauty, harmony, grandeur, and elegance; every thing that can soothe the mind, gratify the fancy, or move the affections. They present human nature under a different aspect from that which it assumes, when viewed by other sciences. They bring to light various springs of action, which, without their aid, might have passed unobserved; and which, though of a delicate nature, frequently exert a powerful influence on several departments of human life. Such studies have also this peculiar advantage, that they exercise our reason without fatiguing it. They lead to inquiries acute, but not painful; profound, but not dry or abstruse. They strew flowers in the path of science, and while they keep the mind bent, in some degree, and active, they relieve it at the same time from that more toilsome labour to which it must submit in the acquisition of necessary erudition, or the investigation of abstract truth. Besides, the study of polite literature furnishes an agreeable amusement for those intervals of leisure which occur in every man's life; and thus prevents his being a burden to himself, or recurring to the indulgence of pernicious passions, and the pursuit of licentious pleasures. The satisfaction which this study imparts occupies a kind of middle station between those of mere sense and those of pure intellect; they refresh the mind after the toils of intellect, and the labour of abstract study; and they

gradually raise it above the attachments of sense, and prepare it for the enjoyments of virtue. Of those whose minds in early life incline to polite literature, good hopes may be entertained, as this liberal and elegant turn is favourable to many virtues; whereas, to be entirely void of relish for eloquence, poetry, or any of the fine arts, is an unpromising symptom of youth, and furnishes suspicions of their being prone to low gratifications, or destined to drudge in the more vulgar and illiberal pursuits of life. A cultivated taste increases sensibility to all the tender and humane passions, by giving them frequent exercise, while it tends to weaken the more violent and fierce emotions.

The elevated sentiments and high examples which poetry, eloquence, and history, are often bringing under our view, naturally tend to nourish in our minds public spirit, the love of glory, contempt of external fortune, and the admiration of what is truly illustrious and great. Although it should not be said that the improvement of taste and virtue are the same, or that they may be always expected to co-exist in an equal degree; yet it must be allowed, that the exercise of taste is, in its native tendency, moral and purifying. From reading the most admirable productions of genius, in poetry or in prose, almost every one rises with some good impressions on his mind; and though these may not always be durable, they are at least to be ranked among the means of disposing the heart to virtue. Indeed, without possessing the virtuous affections in a strong degree, no man can attain eminence in the sublime parts of eloquence. He must feel what a good man feels, if he expects greatly to move or to interest mankind. They are the ardent sentiments of honour, virtue, magnanimity, and public spirit, that only can kindle that fire of genius, and call up into the mind those high ideas, which attract the admiration of ages; and if this spirit be necessary to produce the most distinguished efforts of eloquence, it must be necessary also to our relishing them with proper taste and feeling.

Many of the subjects included in the belles lettres have already passed in review before us in the former part of this work, as Grammar, including Language, History, &c., each of which were of sufficient importance to form a separate chapter. We shall now proceed to a few remarks on Rhetoric, including Style, Composition, &c.; Epistolary Correspondence, and Poetry.

## Section I.—Rhetoric.

In its primary sense, this term implies the art of speaking copiously on any subject, in such a manner as shall combine the

advantages of beauty and force. It is the object of rhetoric to attempt to produce conviction concerning some particular object, that it may influence the will to a corresponding determination.

In order to persuade, the most essential requisites are, solid arguments, clear method, a character of probity appearing in the speaker, joined with such graces of style and utterance as shall draw our attention to what he says. Good sense is the foundation of all. No man can be truly eloquent without it, for fools can persuade none but fools. In order to persuade a man of sense, you must first convince him; which is only to be done by satisfying his understanding of the reasonableness of what you propose to him. But in order to persuade, the orator must go farther than merely producing conviction; he must consider man as a creature moved by many different springs, and must act upon them all. He must address himself to the passions; he must paint to the fancy, and touch the heart; and hence, besides solid argument and clear method, all the conciliating and interesting arts, both of composition and pronunciation, enter into the idea of eloquence.

We may distinguish three kinds, or degrees, of eloquence. The first and lowest is that which aims only at pleasing the hearers. Such generally is the elegance of panegyrics, inaugural orations, addresses to great men, and other harangues of this sort. A second and a higher degree of eloquence is, when the speaker aims not merely to please, but also to inform, to instruct, to convince; when his art is exerted in removing prejudices against himself and his cause; in choosing the most proper arguments; stating them with the greatest force; arranging them in the best order; expressing and delivering them with propriety and beauty. But there is a third, and still higher degree of eloquence, wherein a greater power is exerted over the human mind; by which we are not only convinced, but are interested, agitated, and carried along with the speaker; our passions are made to rise together with his; we enter into all his emotions; we love, we detest, we resent, according as he inspires us; and are prompted to resolve, or to act with vigour and warmth. Debate in popular assemblies opens the most illustrious field to this species of eloquence; and the pulpit also admits it in a considerable degree.

The parts which compose a discourse have been variously stated by different writers on rhetoric. According to Dr. Blair these are, first, the Exordium, or Introduction; secondly, the Statement, and the Division of the Subject; thirdly, Narration and Explanation; fourthly, the Reasoning, or Arguments; fifthly, the Pathetic part; and lastly, the Conclusion. It does not follow

that each of these must enter into every public discourse, or that they must be always introduced in this order. There may be many excellent discourses in public, where several of these parts are altogether wanting. But as these are the natural constituent parts of a regular oration, and as in every discourse whatever some of them must be found, it is necessary to our present purpose to treat of each of them distinctly.

1. *The Exordium*, or *Introduction*, is manifestly necessary to prepare the minds of the hearers for a suitable reception of the discourse. It is not a rhetorical invention, but is founded upon nature and suggested by common sense. When one is going to counsel another; when he takes upon him to instruct, or to reprove; prudence will generally direct him not to do it abruptly, but to use some preparation; to begin with somewhat that may incline the persons to whom he addresses himself to judge favourably of what he is about to say; and may dispose them to such a train of thought as will forward and assist the purpose which he has in view. This is, or ought to be, the main scope of an introduction.

2. *The Proposition* and *Division*. In every just and regular discourse, the speaker's intention is to prove or illustrate something; and when he lays down the subject upon which he designs to treat in a distinct and express manner, this is called the proposition. Sometimes, to give a clearer and more distinct view of the discourse, he subjoins to the proposition the general heads of argument by which he endeavours to support it.

It is sometimes convenient to divide these again, or at least some of them, into several parts or members; and when this happens, it is best done as the speaker comes to each of them in the order at first laid down; by which means the memory of the hearers will be less burdened, than by a multitude of particulars at one and the same time. This subdividing, however, should never be admitted but when absolutely necessary.

3. *Narration* and *Explanation* form the next constituent part of a discourse. These two are put together, both because they fall nearly under the same rules, and because they commonly answer the same purpose; serving to illustrate the cause or the subject of which the orator treats, before he proceeds to argue either on one side or other, or make any attempt for interesting the passions of the hearers.

In pleadings at the bar, narration is often a very important part of a discourse, and requires to be particularly attended to. Besides its being, in any case, no easy matter to relate with grace and propriety, there is in narrations at the bar a peculiar difficulty. The

pleader must say nothing but what is true; and at the same time he must avoid saying any thing that will hurt his cause. The facts which he relates are to be the groundwork of all his future reasoning. To recount them so as to keep strictly within the bounds of truth, and yet to present them under the colours most favourable to his cause; to place in the most striking light every circumstance which is to his advantage, and to soften and weaken such as make against him; demand no small exertion of skill and dexterity.

In sermons, where there is seldom any occasion for narration, explication of the subject to be discoursed on comes in the place of narration at the bar, and is to be taken up much on the same tone; that is, it must be concise, clear, and distinct, and in a style correct and elegant rather than highly adorned. The great art in succeeding in it is, to meditate profoundly on the subject, so as to be able to place it in a clear and strong point of view. Consider what light other passages of Scripture throw upon it; consider whether it be a subject nearly related to some other from which it is proper to distinguish it; consider whether it can be illustrated to advantage by comparing it with, or opposing it to, some other thing; by inquiring into causes, or tracing effects; by pointing out examples, or appealing to the feelings of the hearers; that thus, a definite, precise, circumstantial view may be afforded of the doctrine to be inculcated.

4. The *Argument.* In the argumentative part of a discourse two different methods may be used by orators, the terms of art for which are, the analytic and the synthetic.

The analytic method is, when the orator conceals his intention concerning the point he is to prove, till he has gradually brought his hearers to the designed conclusion. They are led on, step by step, from one known truth to another, till the conclusion steals upon them, as the natural consequence of a chain of propositions. As, for instance, when one intending to prove the being of a God, sets out with observing that every thing which we see in the world has had a beginning; that whatever has had a beginning, must have had a prior cause; that in human productions, art shown in the effect, necessarily infers design in the cause; and proceeds leading you on from one cause to another, till you arrive at one supreme First Cause, from whom is derived all the order and design visible in his works.

But there are few subjects that will admit of the analytic method, and not many occasions on which it is proper to be employed. The mode of reasoning more generally used, and most suited to the train of popular speaking, is what is called the synthetic; when the point to be proved is fairly laid, and one argument

after another is made to bear upon it, till the hearers be fully convinced. Now, in all arguing, one of the first things to be attended to is, among the various arguments which may occur upon a cause, to make a proper selection of such as appear to one's self the most solid, and to employ these as the chief means of persuasion. Every speaker should place himself in the situation of a hearer, and think how he would be affected by those reasons which he purposes to employ for persuading others.

Supposing the arguments properly chosen, it is evident that their effect will, in some measure, depend on the right arrangement of them, so as they shall not jostle and embarrass one another, but give mutual aid, and bear with the fairest and fullest direction on the point of view. Concerning this, the following rules may be taken:—1. Avoid blending arguments confusedly together that are of a separate nature. All arguments whatever are directed to prove one or other of these three things:—that something is true, that it is morally right or fit, or that it is profitable and good. These make the three great subjects of discussion among mankind—truth, duty, and interest. But the arguments directed towards any one of them are generally distinct; and he who blends them all under one topic, which he calls his argument, as, in sermons especially, is too often done, will render his reasoning indistinct and inelegant. 2. With regard to the different degrees of strength in arguments, the general rule is, to advance in the way of climax. This especially is to be the course when the speaker has a clear cause, and is confident that he can prove it fully. He may then adventure to begin with feebler arguments, rising gradually, and not putting forth his whole strength till the last, when he can trust to his making a successful impression on the minds of his hearers, prepared by what has gone before. But this rule is not to be always followed; for if he distrusts his cause, and has but one material argument on which to lay the stress, putting less confidence in the rest, in this case it is often proper for him to place this material argument in the front, to pre-occupy the hearers early, and make the strongest effort at first. 3. When our arguments are strong and satisfactory, the more they are distinguished and treated apart from each other the better. Each can then be brought out by itself, placed in its full light, amplified and rested upon. But when our arguments are doubted, and only of the presumptive kind, it is safer to throw them together in a crowd, and to run them into one another, that, though infirm of themselves, they may serve mutually to prop each other.

5. *The Pathetic Part.* In treating of this part of eloquence, the ancients made the same sort of attempt as they employed with

respect to the argumentative part, in order to bring rhetoric into a more perfect system. They inquired metaphysically into the nature of every passion; they gave a definition and description of it; they treated of its causes, its effects, and its concomitants; and thence deduced rules for working upon it.

On the head of the pathetic, Dr. Blair gives the following directions:—1. To consider carefully whether the subject admit the pathetic and render it proper; and if it does, what part of the discourse is the most proper for attempting it. 2. Never to set apart a head of a discourse in form for raising any passion; never give warning that you are about to be pathetic, and call upon your hearers, as is sometimes done, to follow you in the attempt. This scarcely ever fails to prove a refrigerant to passion. 3. It is necessary to observe that there is a great difference between showing the hearers that they ought to be moved, and actually moving them. 4. The only effectual method is to be moved yourselves. There are a thousand interesting circumstances suggested by real passion, which no art can imitate, and no refinement can supply. The internal emotion of the speaker adds a pathos to his words, his looks, his gestures, and his whole manner, which exerts a power almost irresistible over those who hear him. 5. It is necessary to attend to the proper language of the passions. We should observe in what manner any one expresses himself who is under the power of a real and a strong passion; and we shall always find his language unaffected and simple. 6. Avoid interweaving any thing of a foreign nature with the pathetic part of a discourse. Lastly, Never attempt prolonging the pathetic too much. Warm emotions are too violent to be lasting. Study the proper time of making a retreat, of making a transition from the passionate to the calm tone.

6. *The Peroration,* or *Conclusion.* It is obvious that this must vary so considerably that no rules can be given which will apply universally. Sometimes it may be preceded by a summary or recapitulation of what the speaker had before offered on his subject; but this can rarely be done with good effect, and when introduced, should be very concise, and should preserve, as far as possible, the exact order of the discourse. Sometimes the whole pathetic part comes in most properly at the peroration. In sermons, inferences from what has been said, make a common conclusion. In all discourses it is a matter of importance to hit the precise time of concluding, so as to bring our discourse just to a point; neither ending abruptly and unexpectedly, nor disappointing the expectation of the hearers when they look for a close, and continuing to hover round and round the conclusion, till they become heartily

tired of us. We should endeavour to go off with a good grace; not to end with a languishing and dwindling sentence; but to close with dignity and spirit; that we may have the minds of the hearers warm, and dismiss them with a favourable impression of the subject and of the speaker.

## STYLE AND LANGUAGE.

The rise and progress of oral and written language has been alluded to in Chapters II. and III.; we shall only, therefore, remark in general, that we live at a period when this artificial method of communicating thought is carried to the highest perfection. Language is become a vehicle by which the most delicate and refined emotions of one mind can be transmitted, or, if we may so speak, transfused into another.

It is not easy to give a precise idea of what is meant by style. In general it is the peculiar manner in which a man expresses his conceptions by means of language. It is different from mere language or words. The words which an author employs may be proper and faultless, and his style may, nevertheless, have great faults: it may be dry, stiff, feeble, or affected. Style has always some reference to an author's manner of thinking. It is a picture of the ideas which rise in his mind, and of the manner in which they rise there; and hence, when we are examining an author's composition, it is in many cases extremely difficult to separate the style from the sentiment. No wonder these two should be so intimately connected, as style is nothing else than that sort of expression which our thoughts most readily assume.

As it is impossible here to separate the two leading qualities of style, perspicuity and ornament, we shall treat of them together, in order to bring under one view, all that seems necessary to be attended to in the construction and arrangement of words in a sentence. The properties most essential to a perfect sentence are the four following:—

1. Clearness and Precision. 2. Unity. 3. Strength. 4. Harmony.

*Clearness* and *Precision.* The least failure here, the least degree of ambiguity, which leaves the mind in any sort of suspense as to the meaning, ought to be avoided with the greatest care; nor is it so easy a matter to keep always clear of this, as one might at first imagine. Ambiguity arises from two causes:—either from a wrong choice of words, or a wrong collocation of them. In the collocation of words the first thing to be studied, is to observe exactly

the rules of grammar, as far as these can guide us. But as the grammar of our language is not extensive, there may often be an ambiguous collocation of words, where there is no transgression of any grammatical rule. The relation which the words or members of a period bear to one another, cannot be pointed out in English, as in the Greek or Latin, by means of termination; it is ascertained only by the position in which they stand. Hence a capital rule in the arrangement of sentences is, that the words or members most nearly related should be placed in the sentence as near to each other as possible, so as to make their mutual relation clearly appear.

*Unity.* The second quality of a well-arranged sentence is termed its unity. This is a capital property. In every composition, of whatever kind, some degree of unity is required in order to render it beautiful. There must be always some connecting principle among the parts. Some one object must reign and be predominant. This holds in history, in epic and dramatic poetry, as well as in rhetoric. But most of all, in a single sentence is required the strictest unity; for the very nature of a sentence implies one proposition to be expressed. It may consist of parts, indeed, but these parts must be so closely bound together, as to make the impression upon the mind of one object, not many.

*Strength.* The third quality of a correct sentence is termed strength. By this is meant such a disposition of the several vowels and members as shall bring out the sense to the best advantage, as shall render the impression which the period is designed to make most full and complete, and give every word and every member their due weight and force. The two former qualities of perspicuity and unity, are, no doubt, absolutely necessary to the production of this effect; but more is still requisite; for a sentence may be clear enough, it may also be compact enough in all its parts, or have the requisite unity; and yet, by some unfavourable circumstance in the structure, it may fail in that strength or liveliness of impression which a more happy arrangement would have produced.

*Harmony.* We are now to consider words with respect to their sound, their harmony or agreeableness to the ear. Sound is a quality much inferior to sense, yet such as must not be disregarded; for as long as sounds are the vehicle of conveyance for our ideas, there will be always a very considerable connexion between the idea which is conveyed, and the nature of the sound which conveys it. In the harmony of periods, two things may be considered. First, agreeable sound, or modulation in general, without any particular expression. Next, the sound so ordered as to become expressive of the sense. The first is the more common; the

second the higher beauty. This beauty of musical construction in prose, it is plain, will depend upon two things—the choice of words, and the arrangement of them.

It is evident that words are most agreeable to the ear which are composed of smooth and liquid sounds, where there is a proper intermixture of vowels and consonants; without too many harsh consonants rubbing against each other, or too many open vowels in succession, to cause a hiatus or disagreeable aperture of the mouth. It may always be assumed as a principle, that, whatever sounds are difficult in pronunciation, are, in the same proportion, harsh and painful to the ear. Vowels give softness, consonants strength to the sounds of words. The music of language requires a just proportion of both, and will be hurt, will be rendered either grating or effeminate, by an excess of either. Long words are commonly more agreeable to the ear than monosyllables. The harmony which results from a proper arrangement of the words and members of a period is more complex, and of greater nicety. For let the words themselves be ever so well-chosen, and well sounding, yet, if they be ill disposed, the music of the sentence is utterly lost.

Hitherto we have discoursed of agreeable sound or modulation in general: it yet remains to treat of a higher beauty of this kind—the sound adapted to the sense. The former was no more than a simple accompaniment to please the ear; the latter supposes a peculiar expression given to the music. We may remark two degrees of it; first, the current of sound adapted to the tenor of a discourse; next, a particular resemblance effected between some object and the sounds that are employed in describing it. Sounds have, in many respects, a correspondence with our ideas, partly natural, partly the effect of artificial association. Hence it happens, that any one modulation of sound continued, imprints on our style a certain character and expression. Sentences constructed with the Ciceronian fulness and swell, produce the impression of what is important, magnificent, sedate; for this is the natural tone which such a course of sentiment assumes. But they suit no violent passion, no eager reasoning, no familiar address. These always require measures brisker, easier, and often more abrupt. And therefore, to swell, or to let down the periods as the subject demands, is a very important rule in oratory. No one tenor whatever, supposing it to produce no bad effect from satiety, will answer to all different compositions; nor even to all the parts of the same composition. It were as absurd to write a panegyric and an invective in a style of the same cadence, as to set the words of a tender love-song to the air of a warlike march. But in the next

place, besides the general correspondence of the current of sound with the current of thought, there may be a more particular expression attempted of certain objects by means of resembling sounds. This can be sometimes accomplished in prose composition, but there only in a more faint degree; nor is it so much expected there. In poetry, chiefly, it is looked for, where attention to sound is more demanded, and where the inversions and liberties of poetical style give us a greater command of sound; assisted too by the versification, and that cantus obscurior to which we are naturally led in reading poetry.

The pronunciation or delivery of a discourse is a very important branch of oratory. How much stress was laid upon this by the most eloquent of all orators, Demosthenes, appears from a noted saying of his, related both by Cicero and Quintilian; when, being asked what was the first point in oratory, he answered, "Delivery;" and being asked what was the second, and afterwards what was the third, he still answered, "Delivery." There is no wonder that he should have rated this so high, and that, for improving himself in it, he should have employed those assiduous and painful labours which all the ancients take so much notice of.

The great objects which every public speaker will naturally have in his eye in forming his delivery are, first, to speak so as to be fully and easily understood by all who hear him; and, next, to speak with grace and force, so as to please and move his audience. In order to be fully and easily understood, the four chief requisites are, a due degree of loudness of voice, distinctness, slowness, and propriety of pronunciation.—The first attention of every public speaker, doubtless, must be to make himself heard by all those to whom he speaks. He should endeavour, if he can, to fill the place where he speaks. But still he ought to be careful not to exceed the natural key of his voice. If he does, it will neither be soft nor agreeable, but either harsh or rough.

In the next place to being well heard and clearly understood, distinctness of articulation contributes more, perhaps, than mere loudness of sound. The quantity of sound necessary to fill even a large space is smaller than is commonly imagined; and with distinct articulation, a man of a weak voice will make it reach farther than the strongest voice can reach without it. To this, therefore, every public speaker ought to pay great attention.

The next property of the voice above mentioned was slowness. That some expressions ought to be pronounced faster than others is very manifest. Gay and sprightly ideas should not only be expressed louder, but also faster, than such as are sad and melancholy. And when we press an adversary, the voice should be brisk and

quick. But to hurry on in a precipitant manner, without pausing till stopped for want of breath, is certainly a very great fault.

The fourth requisite in a public speaker is propriety of pronunciation, or the giving to every word which he utters that sound which the most polite usage of the language appropriates to it, in opposition to broad, vulgar, or provincial pronunciation. This is requisite, both for speaking intelligibly, and for speaking with grace or beauty. Instructions concerning this article can be given by the living voice only.

The higher parts of delivery may be comprised under the heads of emphasis, pauses, and tones.

By *Emphasis* is meant a stronger and fuller sound of voice, by which we distinguish the accented syllable of some word, on which we design to lay particular stress, and to show how it affects the rest of the sentence. Sometimes the emphatic word must be distinguished by a particular tone of voice, as well as by a stronger accent. On the right management of the emphasis depend the whole life and spirit of every discourse. If no emphasis be placed on any words, not only is discourse rendered heavy and lifeless, but the meaning left often ambiguous. If the emphasis be placed wrong, we pervert and confound the meaning wholly. To give a common instance; such a simple question as this, "Do you ride to town to-day?" is capable of no fewer than four different acceptations, according as the emphasis is differently placed on the words. If it be pronounced thus: Do *you* ride to town to-day? the answer may naturally be, No; I send my servant in my stead. If thus: Do you *ride* to town to-day? Answer, No; I intend to walk. Do you ride to *town* to-day? No; I ride into the fields. Do you ride to town *to-day?* No; but I shall to-morrow.

Next to emphasis, the *Pauses* in speaking demand attention. These are of two kinds; first, emphatical pauses; and next, such as mark the distinctness of sense. An emphatical pause is made after something has been said of peculiar moment, and on which we want to fix the hearer's attention. Sometimes before such a thing is said, we usher it in with a pause of this nature. Such pauses have the same effect as a strong emphasis; and are subject to the same rules; especially to the caution just now given, of not repeating them too frequently.

*Tones* in pronunciation are different both from emphasis and pauses; consisting in the modulation of the voice, the notes or variations of sound which we employ in public speaking. How much of the propriety, the force, and grace of discourse, must depend on these, will appear from this single consideration, that to almost every sentiment we utter, more especially to every strong

emotion, nature has adapted some peculiar tone of voice; insomuch, that he who should tell another that he was very angry, or much grieved, in a tone which did not suit such emotions, instead of being believed, would be laughed at. Sympathy is one of the most powerful principles by which persuasive discourse works its effect. The speaker endeavours to transfuse into his hearers his own sentiments and emotions; which he can never be successful in doing, unless he utters them in such a manner as to convince his hearers that he feels them. The proper expression of tones, therefore, deserves to be attentively studied by every one who would be a successful orator.

*Gesture.* By gesture is meant a suitable conformity of the motions of the countenance, and several parts of the body, in speaking, to the subject matter of the discourse. The fundamental rule as to propriety of action is undoubtedly the same which is already given as to propriety of tone. Attend to the looks and gestures in which earnestness, indignation, compassion, or any other emotion discovers itself to most advantage in the common intercourse of men, and let these be your model. Some of these looks and gestures are common to all men; and there are also certain peculiarities of manner which distinguish every individual. A public speaker must take that manner which is most natural to himself. For it is here just as in tones: it is not the business of a speaker to form to himself a certain set of motions and gestures, which he thinks most becoming and agreeable, and to practise these in public, without their having any correspondence to the manner which is natural to him in private. His gestures and motions ought all to carry that kind of expression which nature has dictated to him; and, unless this be the case, it is impossible, by means of any study, to avoid their appearing stiff and forced.

To conclude; above all things guard against all affectation, which is the certain ruin of good delivery. Let your manner, whatever it is, be your own; neither imitated from another, nor assumed upon some imaginary model, which is unnatural to you. Whatever is native, even though accompanied with several defects, yet is likely to please; because it shows us a man; because it has the appearance of coming from the heart: whereas a delivery, attended with several acquired graces and beauties, if it be not easy and free, if it betray the marks of art and affectation, never fails to disgust.

## Section II.—Epistolary Correspondence.

Many of the observations in the preceding section in relation to style and language will apply with equal propriety to epistolary correspondence; there are nevertheless some points of difference in which a peculiarity of management is needful.

Had letters been known at the beginning of the world, it is probable that epistolary writing would have been as old as love and friendship; for as soon as they began to be employed in the communication with an absent friend, the verbal messenger was dropped, the language of the heart was committed to characters that faithfully preserved it, secrecy was maintained, and social intercourse rendered more free and agreeable. The art of epistolary writing was esteemed by the Romans among the number of liberal and polite accomplishments; and Cicero, in some of his letters, mentions with great pleasure the elegant specimens of epistolary composition which he had received from his son. It seems indeed to have formed part of the education of the Romans; and it deserves to have a share in ours. "It has," says Mr. Locke, "so much to do in all the occurrences of life, that no gentleman can avoid showing himself in this kind of writing. Occasions will daily force him to make this use of his pen; which, besides the consequences that, in his affairs, his well or ill managing of it often draws after it, always lays him open to a severer examination of his breeding, his sense, and his abilities, than oral discourses, whose transient faults, dying for the most part with the sound that gives them life, and so not subject to a strict review, more easily escape observation and censure."

The first and fundamental requisite in epistolary writing is to be natural and simple, for a stiff and laboured manner is as improper in a letter as in conversation. This does not banish sprightliness and wit. These are graceful in letters as well as in conversation; when they flow easily, and without being studied; when employed so as to season, and not to encumber the style. A person, who either in conversation or in letters affects to shine and sparkle always, will not please long. The style of letters should be neat and correct, but not too highly polished. Nicety about words betrays study; and on this account musical periods, and appearances of number and harmony in arrangement, should be carefully avoided in letters. Those that are written with the greatest facility are commonly the best. Nevertheless, it should be remembered that the ease and simplicity of epistolary writing are not to be understood as importing entire carelessness. In writing

to the most intimate friend, a certain degree of attention, both to the subject and the style, is requisite and becoming. The first requisite, both in conversation and correspondence, is to regard all the proper decorums which our own character and that of others demand.

The epistles of Cicero are perhaps the most valuable collection of letters in any language, as they are letters of real business, written to the greatest men of the age, composed with purity and elegance, but without the least affectation, and, what adds greatly to their merit, written without any intention of being published to the world. Pliny's letters are elegant and polite, and exhibit a very pleasing and amiable view of the author; but, according to the vulgar phrase, they savour too much of the lamp. They are too elegant and fine; the author seems to be casting his eye towards the public, when he is appearing to write only to his friends. His style abounds so much with turns and quibbles upon the sound of words, as to render it more stiff and affected than agrees with conversation, or than a man of sense would choose to use in discourse, if it were in his power. This indeed was owing to the age in which he lived, at which time the Roman eloquence was sunk into puns, and an affectation of wit; for Pliny was otherwise a man of fine sense and great learning.

The most distinguished collection of letters in the English language is that of Mr. Pope, Dean Swift, and their friends; published partly in Mr. Pope's works, and partly in those of Dean Swift. Many letters in this collection are written with ease and a beautiful simplicity. Those of Dr. Arbuthnot deserve this commendation. Dean Swift's are unaffected. Several of Lord Bolingbroke's and of bishop Atterbury's letters are masterly. Mr. Pope's are too artificial. Among the French in the last age, Balzac and Voiture were the two most celebrated epistolary writers. Balzac's periods are swelling, and his style pompous; so that his reputation soon declined. Voiture continued for a long time a favourite author. His composition is extremely sparkling; he manifests much wit, and trifles agreeably. His only fault is, that he is too open and professed a wit to be thoroughly agreeable as a letter writer. The letters of Madame de Sevigné are esteemed the most accomplished model of a familiar correspondence. Trifling as are their subjects, and overloaded as they are with compliments, they show such perpetual sprightliness, they contain such easy and varied narration, and so many strokes of the most lively and beautiful painting, perfectly free from any affectation, that they are justly entitled to high praise. The letters of lady Mary Wortley Montague possess much of the French ease and

vivacity, and retain the character of an agreeable epistolary style in an equal degree. In more modern times there are scarcely any letters which combine more varied qualities of good sense, wit, and playfulness, than those of the poet Cowper, introduced in his life by Hayley.

Letter writing is a subject of so varied and extensive a nature, that it can scarcely be reduced to rules of universal application But some instruction respecting it may doubtless be communicated to young persons; and the following, together with the observations that accompany them, have been recommended for that purpose.

I. When you write a letter to any person, express the same sentiments, and use the same language as you would do if you were conversing with him. "Write eloquently," says Mr. Gray, "that is, from your heart, in such expressions as that will furnish." This rule is of primary importance for the attainment of ease and simplicity in epistolary composition; but it will not, with equal efficacy, promote correctness and propriety, unless we accustom ourselves to think, and to express our thoughts accurately and properly, in common conversation.

II. Before you begin a letter, especially when it is on any occasion of importance, weigh well in your own mind the design and purport of it; and consider, very attentively, what sentiments are most proper for you to express, and your correspondent to read. The observance of this rule is highly useful. To those who have few thoughts, it affords an opportunity of adding to the stock; and to those who are overwhelmed by the abundance, or perplexed by the variety of them, it gives ample scope for selection.

III. Let all your sentiments and expressions be consistent with truth and virtue. Avoid exaggerated and extravagant professions of regard; suppress every unjust or malignant thought; encourage pious and benevolent affections in your own mind, and in the minds of those whom you address. This rule, which is important in conversation, is much more so in letters, because writing allows an opportunity for consideration, which renders error of every kind more inexcusable. "Let me conjure you," says bishop Atterbury, in a letter to his son, "never to say anything, either in a letter or in common conversation, that you do not think; but always let your mind and your words go together, even on the most slight and trivial occasions."

IV. Vary your style, and adapt it to the subject of your letter, and also to the character, the situation, and other peculiar circumstances of the person to whom you write. As the occasion on which letters are written, and the situation, feelings, and

acquirements of those who write them, as well as of those to whom they are written, are so various, a great diversity of style necessarily becomes requisite. On important subjects, it should be strong and solemn; on lighter subjects, easy and simple; in exhortation, earnest; in persuasion, mild; in consolation, tender; in congratulation, lively; in requests, modest; in commendation, warm; to superiors, respectful; to inferiors, courteous; to friends and companions, familiar.

V. Scrupulously adhere to the rules of grammar. Select and apply all your words with a strict regard to their proper signification; and whenever you have any doubt respecting the correctness or propriety of them, consult a dictionary, or some good living authority. Avoid with particular care all errors in orthography, in punctuation, and in the arrangement of words and phrases.

VI. Endeavour, particularly in letters on business, to express your meaning as briefly as the nature of the subject will admit; and in such terms as are least likely to be misunderstood. Avoid unnecessary tautology, explanation, and long and frequent parentheses. Place the principal circumstances in the most prominent point of view; suppress, or slightly mention, those which are of a trivial nature. Make no quotations in foreign languages, nor any classical allusions, however apt or beautiful, except when you are writing to persons to whom they will be intelligible and pleasing. Before you seal your letter, always read it over very attentively; and correct every inaccuracy or error which you discover in it, that might, in the slightest degree, perplex or mislead your correspondent. A plain, concise style is the best adapted for business. Letters of sentiment, of affection, and friendship, naturally admit of more enlargement. Long sentences should generally be avoided in epistolary composition. They may please the ear, but they usually occasion some degree of obscurity; and they are burthensome to the memory. Well constructed sentences that are short, or of a moderate length, strike the mind forcibly and agreeably; and the tenour of them is easily remembered.

VII. Let the exterior appearance of your letter, as well as its intrinsic qualities, be the object of your attention. Write a fair and legible hand. Be sparing in the use of dashes, interlineations, and underlinings. Make no abbreviations in orthography, except those which are warranted by the general practice of the most correct writers. Always leave a vacancy for the seal or wafer, in order that, when your correspondent opens your letter, no part of the writing may be torn. Write your name at length, with particular distinctness and uniformity, and in rather larger character than that in which your letter is written. Avoid postscripts, except when

they are necessary for the mentioning of some circumstance that occurred after your letter was written. Fold, direct, and seal your letter neatly. Of the propriety of leaving a vacancy for the seal, the following circumstance, which is similar to what frequently occurs, affords a striking proof. "I had a letter from a friend lately," says Mr. Orton, in a letter to a young clergyman, "who desired me to transact some business for him, which was the chief purport of his letter; but he had unfortunately put the wafer on the most material part of the commission, so that I could not tell what he had desired me to do for him."

In regard to letters of business, the circumstances are too various and multiform to be anticipated so as to receive any material assistance from specimens of that style of composition. We can therefore only recommend an attention to the foregoing rules as far as they are applicable, and particularly to No. 6. Nor are the transactions of trade and commerce of a nature to admit of any great variety of expression, or the introduction of any of the qualities which constitute a good style of writing, except plainness and perspicuity.

## Section III.—Poetry.

This term includes more than merely the art of versification, since it is possible to write verses in regular measure, which have no claim to the denomination of poetry, while, on the other hand, some of the most beautiful specimens of poetic composition are very deficient in regularity of measure, and others are written without even an attempt at measure at all. It appears, therefore, that many qualities must be combined in order to constitute true poetry. Bossu very justly includes in his idea of the art, cadences, peculiar constructions, and expressions unknown in common discourse; and, above all, a certain noble, bold, elevated and metaphorical turn and manner of diction. These, he observes, are so essential to poetry, that without them the most exact arrangement of long and short syllables makes little more than a kind of measured prose. The most just and comprehensive definition of poetry is, "that it is the language of passion, or of enlivened imagination, formed most commonly into regular numbers."

Amidst the obscurity which envelopes the first ages of the world, reason and history still throw some light on the origin of this art. Reason suggests that, before the invention of letters, mankind had no method of transmitting to their descendants religious ceremonies, their laws, or the renowned actions of their sages and heroes, except by poetry; which included all these subjects in a

kind of hymns which fathers sung to their children, thus impressing them deeply on their memories. The scriptures inform us, that Moses and Miriam, the first authors known to mankind, sung on the borders of the Red Sea a song of praise, to celebrate the deliverance of the Israelites from Egyptian bondage. This song has been transmitted to us, and forms an unrivalled specimen of poetical composition. See Exodus xv.

The literary annals of all nations afford vestiges of poetry from the remotest ages. They are found among the most savage of the ancient barbarians, and among the most desolate of the Americans. Tacitus mentions the verses and hymns of the Germans at the time when that people inhabited the woods, and retained the most uncivilized manners. The first inhabitants of Russia and the other northern countries, those of Gaul, Albion, Iberia, and other nations of Europe, had their poetry, as well as the ancient people of Asia, and the known borders of Africa. But the simple productions of nature have uniformly something unformed, rough, and savage.

It has been a prevalent opinion, sanctioned by the concurring voice of antiquity, that poetry is older than prose. This, however, can apply only to writings, since there never existed any period of society in which men conversed with each other in poetical numbers. But from the commencement of the social life, they occasionally met together for feasts, sacrifices, and public assemblies; and on such occasions their principal entertainment consisted in music, song and dance. In the rude effusions which the enthusiasm of fancy or passion suggested to untaught men, when roused by interesting events, and their meeting together in public assemblies, we discover the first beginnings of poetic composition. Two particulars, says Dr. Blair, would early distinguish this language of song from that in which they conversed on the common occurrences of life; namely, an unusual arrangement of words, and the employment of bold figures of speech.

Among the earliest poetic compositions we may also reckon odes and hymns, dictated by religious feelings; plaintive or elegiac poetry, would as naturally arise from lamentations over deceased friends; epic poetry derived its origin from the recital of the achievements of their heroes and ancestors; and not contented with simply reciting these, they would be led, at some of their public meetings, to represent them, by introducing different bards speaking in the character of their heroes, and answering each other, in which practice we discern the first outlines of tragedy, or dramatic writing. But, in the first ages of society, none of these kinds of poetry were properly distinguished or separated, as they are now, from each other. At first, history, eloquence, and poetry

were the same; but when the progress of society induced a separation of the different arts and professions of civil life, it led also by degrees to a separation of the variety of literary productions. In process of time the art of writing was invented, and poetry became a separate art, calculated chiefly to please, and confined generally to such subjects as related to the imagination and passions. Even its earliest companion, music, was in a great measure divided from it. This separation produced consequences not altogether favourable to poetry, and in many respects injurious to music. As long as they remained united, music enlivened and animated poetry, and poetry gave force and expression to musical sound; and the latter still preserves some remains of its first and original connexion with music. By being uttered in song it was formed into numbers, or into an artificial arrangement of words and syllables, very different in different countries; but such as to the inhabitants of each seemed most melodious and agreeable in sound. Hence arises that great characteristic of poetry which we now call verse. During the decline of the Roman empire, many causes concurred to accelerate the relapse of the Latin poetry into barbarism. Amidst these impediments, however, and the necessary degeneration of taste and style, a few poets supported the character of the Roman muse with tolerable dignity at this period. These were Ansonius, Paulinus, Sidonius, Sedulius, Arator, Juvencus, Prosper, and Fortunatus. With the last, who flourished at the beginning of the sixth century, and was bishop of Poitiers, the Roman poetry is supposed to have expired.

The first age of English poetry, in the reign of Elizabeth, displayed a fantastic combination of chivalrous fancy and feeling with classical pedantry; but, upon the whole, the native genius was unsubdued; and the poems of that age, with all their faults, are the most national part of our poetry, as they undoubtedly contain its highest beauties. From the accession of James I. to the civil war, the glory of Shakspeare turned the whole national genius to the drama; and after the restoration, a new classical school arose. The period which extended from the English to the French revolution was the golden age of authentic history. In such an age, every art becomes rational. Reason is the power which presides in a calm; but reason guides rather than impels; and though it must regulate every exertion of genius, it never can rouse it to vigorous action. The school of Dryden and Pope, which prevailed till a very late period of the last century, is neither the most poetical nor the most national part of our literary annals. These great poets sometimes ventured into the regions of pure poetry. But their general character is, that they rather approached

the elegant correctness of our continental neighbours, than supported the daring flight which, in the former age, had borne English poetry to a sublimer elevation than that of any other modern people of the West. Towards the middle of the eighteenth century, great, though comparatively tranquil changes, began to manifest themselves in the republic of letters, in every European nation which retained any portion of mental activity. About that time, the exclusive authority of our great rhyming poets began to be weakened; new tastes and fashions began to show themselves in the political world.

A school of poetry must have prevailed long enough to be probably on the verge of a downfal, before its practice be embodied in a correspondent system of criticism. Johnson was the critic of our second poetical school. As far as his prejudices of a political or religious kind did not disqualify him for all criticism, he was admirably fitted by nature to be the critic of this species of poetry.

The interval which elapsed between the death of Goldsmith and the rise of Cowper is perhaps more barren than any other twelve years in the history of our poetry since the accession of Elizabeth. The established poetry had worn out either its own resources or the constancy of its readers. Former attempts to introduce novelty had been too weak or too early. Neither the beautiful fancy of Collins, nor the learned and ingenious industry of Warton, nor even the union of sublime genius with consummate art in Gray, had produced a general change in poetical composition. But the time was approaching when a revolution was to be accomplished, of which the commencement nearly coincides with that of the political revolution which had changed the character as well as the condition of Europe.

It is dangerous to speak of living merit, although the present has been perhaps not unjustly denominated the golden age of English poetry. Scott, Byron, Campbell, Southey, Moore, Rogers, Crabbe, Montgomery, and many others, have recently enriched our libraries with the finest effusions of poetic genius. It were perhaps invidious to enter upon a discussion of the merits of these writers; all are endowed with the richest intellectual powers, while each is characterised by some peculiar excellence, and each unrivalled in the department he has chosen. Yet if we might express a wish, it should be, that the brilliant poetic genius of some of the writers to whom we have alluded were employed to raise the tone of morals, and make mankind better, and more happy; instead of being, as it undoubtedly is, more an object of admiration than of esteem. We feel pleasure, however, in the recol-

lection, that, in the far greater number of our best modern poets, literature and genius are consecrated to the service of virtue and true religion.

Much care is necessary in the delineation of poetical character. To conceive the idea of a good man, and to invent and support a good poetical character, are two very different things, though they have sometimes been confounded by critics. The first is easy to any person sufficiently instructed in the duties of life: the last is perhaps the most difficult of all the efforts of human genius; so that, though attempted by many, Homer, Shakspeare, and Milton, are almost the only authors who have succeeded. Characters of perfect virtue, it is agreed, are not the most proper for poetry. It seems to be agreed, that the Deity should not be introduced in the machinery of a poetical fable. To ascribe to him words and actions of human invention seems unbecoming; nor can a poetical description, which must necessarily be infinitely inadequate to the subject, ever satisfy the human mind. But poetical characters, though elevated, should still partake of the passions and frailties of humanity. Without the vices of some principal personages, the Iliad would lose great part of its interest; and the most moving and most eventful parts of the Æneid are those that describe the effects of unlawful passions. Macbeth, perhaps the best tragedy ever written, is founded in crimes of dreadful enormity; and if Milton had not taken into his plan the fall of our first parents, as well as their state of innocence, his poem must have wanted much of its pathos, and could not have been, as it is now esteemed, a treasure of important knowledge, which no other uninspired writer ever comprehended in so small a compass.

Of the agents in Paradise Lost, it has been observed by Dr. Johnson, that "the weakest are the highest and noblest of human beings, the original parents of mankind; with whose actions the elements consented; on whose rectitude or deviation of will depended the state of terrestrial nature, and the condition of all the future inhabitants of the globe. Of the other agents in the poem, the chief are such as it is irreverence to name on slight occasions; the rest are lower powers,

> "——— of which the least could wield
> These elements, and arm him with the force
> Of all their regions;"

powers, which only the control of Omnipotence restrains from laying creation waste, and filling the vast expanse of space with ruin and confusion. To display the motives and actions of beings thus

superior, so far as human reason can examine, or human imagination represent them, is the task which Milton undertook and performed. The characters in the Paradise Lost, which admit of examination, are those of angels and of men; of angels good and evil; of man in his innocent and sinful state. Among the angels, the virtue of Raphael is mild and placid, of easy condescension, and free communication; that of Michael is regal and lofty, attentive to the dignity of his own nature. Abdiel and Gabriel appear occasionally, and act as every incident requires: the solitar fidelity of Abdiel is very amiably painted. Of the evil angels, the characters are more diversified. To Satan such sentiments are given as suit the most exalted and most depraved thing. Milton has been censured for the impiety which sometimes breaks from Satan's mouth; for there are thoughts, it is justly remarked, which no observation of character can justify; because no good man would willingly permit them to pass, however transiently, through his mind." This censure has been proved to be groundless by the great critic whom we have quoted. "To make Satan speak as a rebel," says he, "without any such expressions as might taint the reader's imagination, was indeed one of the greatest difficulties in Milton's undertaking; and I cannot but think that he has extricated himself with great happiness. There is in Satan's speeches little that can give pain to a pious ear. The language of rebellion cannot be the same with that of obedience; the malignity of Satan foams in haughtiness and obstinacy; but his expressions are commonly general, and no otherwise offensive than as they are wicked."

The other chiefs of the celestial rebellion are very judiciously discriminated; and the furious character of Moloch appears, both in the battle and in the council, with exact consistence. To Adam and to Eve are given, during their innocence, such sentiments as innocence can generate and utter. Their love is pure benevolence and mutual veneration; their repasts are without luxury, and their diligence without toil. Their addresses to their Maker have little more than the voice of admiration and gratitude: fruition left them nothing to ask, and innocence left them nothing to fear. But with guilt enter distrust and discord, mutual accusation and stubborn self-defence; they regard each other with alienated minds, and dread their Creator as the avenger of their transgression; at last, they seek shelter in his mercy, soften to repentance, and melt in supplication. Both before and after the fall, the different sentiments arising from difference of sex are traced out with inimitable delicacy and philosophical propriety. Adam has always that pre-eminence in dignity, and Eve in loveliness, which

we should naturally look for in the father and mother of mankind.

The following are some of the more important kinds of poetry, with a few of the leading features by which one is distinguished from the other.

*Epic Poetry* claims a very remote origin, and retains its original characteristics as unpolluted as any other division of the art. The recital of the achievements of heroes and of ancestors, of warriors who had fallen, or who had conquered in battle, would naturally be a subject which, in the earliest periods of society, would call forth the poet's powers. This mode of poetic writing, besides being old, is allowed to be the most dignified, elevated, and majestic, fitted only for the cultivation of men of the finest and most diversified genius. An epic poem is properly the recital of some illustrious enterprise in a poetical form. This definition appears to comprehend several other poems besides the Iliad of Homer, the Æneid of Virgil, and the Jerusalem of Tasso; which are, perhaps, the three most regular and complete epic works that were ever composed. Dr. Blair does not scruple to class such poems as Milton's Paradise Lost, Lucan's Pharsalia, Statius's Thebaid, Ossian's Fingal and Temora, Camoen's Lusiad, Voltaire's Henriade, Cambray's Telemachus, Glover's Leonidas, Wilkie's Epigoniad, under the same composition with the Iliad and Æneid. They are all, undoubtedly, epic; that is, poetical recitals of great adventures.

An epic poem, however, is defective if its actions be not interesting as well as great; for a narrative of mere valour may be so constructed as to prove cold and tiresome. "Much will depend," says Dr. Blair, "on the happy choice of some subject, which will by its nature interest the public; as when the poet selects for his hero one who is the founder, or the deliverer, or the favourite of his nation; or when he writes achievements that have been highly celebrated, or have been connected with important consequences to any public cause. Most of the great epic poems are fortunate in this respect, and must have been very interesting to those ages in which they were composed. On this principle the subject of the Paradise Lost must be considered as more generally interesting than that of any other poem."

*Lyric Poetry*, or the ode, is very ancient, and was probably the first species which was invented. It had its source, we may suppose, from the heart, and was employed to express, with becoming fervour and dignity, the grateful sense man entertained of the blessings which daily flowed from God, the fountain of all good. In process of time, however, it was employed to solicit the aid of

the Supreme Being in time of trouble; as is plain from the odes written by king David and others, and collected by the Jewish sanhedrim into the book of Psalms, to be sung at their feasts, festivals, and on other solemn occasions. Lyric poetry, as its name imports, is intended to be sung or accompanied with music, a distinction not originally confined to any one kind of poetic writing, as music and poetry were coeval, but which the ode was allowed to retain when these two arts were separated. It is a composition in which dignity, energy, and passion, are conspicuous; it is usually meant to be a warm transcript of the poet's heart, a character which it still, in a great measure, retains, though, in modern times, it has been divided into four denominations, each more or less distinct and different from the others. These are sacred odes; heroic odes; moral and philosophical odes; festive and amatory odes. The most celebrated writers of odes of antiquity are Pindar, Anacreon, Horace. In England, Dryden's Ode to St. Cecilia; the Tears of Scotland, by Smollett; and Collins's Ode to the Passions; may be mentioned as, probably, the finest specimens of lyric composition which the country has yet produced.

It remains only to advert to those odes which are of the sublime and noble kind, and distinguished from others by their elevation of thought and diction, as well by the variety or irregularity of their numbers as the frequent transactions and bold excursions with which they are enriched. The most ancient specimen of this kind extant is the celebrated song or ode of Moses, written on the passage of the Israelites over the Red Sea. At the end of this song we are told, that "Miriam the prophetess, the sister of Aaron, took a timbrel in her hand, and all the women went out after her with timbrels and with dances. And Miriam answered them, Sing ye to the Lord, for he hath triumphed gloriously; the horse and his rider hath he thrown into the sea," Exod. xv. This passage is set to music by Handel, and forms one of the most sublime of his choruses. This ode of Moses is incomparably better than any thing the heathen poets have produced of the kind, and is considered as a master-piece of ancient eloquence.

The Pindaric Ode, so called from Pindar, an ancient Greek poet, celebrated for the boldness of his flights, and the seeming wildness and irregularity that runs through his compositions, is the most exalted style of poetry. The odes of Pindar were held in such high estimation by the ancients, that it was fabled, in honour of their sweetness, that the bees, while he was in the cradle, brought honey to his lips; and the victors at the Olympic and other games did not think the crown a sufficient reward for

their merit, unless their achievements were celebrated in Pindar's songs; most wisely presaging that the first would decay, but the other would endure for ever. With respect to those modern compositions which are usually called Pindaric Odes, (but which ought rather to be distinguished by the name of Irregular Odes,) the English language furnishes a considerable number that deserve commendation. Dryden's Ode, entitled Alexander's Feast, is perhaps as valuable in loose and wild numbers, as it could have been written in the manner of Pindar.

We shall close our observations on the sublime kind of lyric poetry, by the introduction of Collins's celebrated Ode to the Passions, which has been rarely equalled.

"When Music, heavenly maid, was young;
While yet in early Greece she sung;
The Passions oft, to hear her shell,
Throng'd around her magic cell;
Exulting, trembling, raging, fainting,
Possest beyond the Muse's painting:
By turns they felt the glowing mind
Disturb'd, delighted, rais'd, refin'd;
Till once, 'tis said, when all were fir'd,
Fill'd with fury, rapt, inspir'd,
From the supporting myrtles round
They snatch'd her instruments of sound;
And, as they oft had heard apart
Sweet lessons of her forceful art,
Each, for madness ruled the hour,
Would prove his own expressive power.

First Fear his hand, its skill to try,
Amid the chords bewilder'd laid,
And back recoil'd, he knew not why,
E'en at the sound himself had made.

Next Anger rush'd—his eyes on fire
In lightnings own'd his secret stings;
In one rude crash he struck the lyre,
And swept with hurried hand the strings.

With woeful measures wan Despair,
Low sullen sounds, his grief beguil'd;
A solemn, strange, and mingled air;
'Twas sad by fits, by starts 'twas wild.

But thou, O Hope! with eyes so fair,
What was thy delighted measure?
Still it whisper'd promis'd pleasure,
And bade the lovely scenes at distance hail!
Still would her touch the strain prolong,
And from the rocks, the woods, the vale,
She call'd on Echo still through all her song;
And where her sweetest theme she chose,
A soft responsive voice was heard at every close,
And Hope enchanted smil'd, and wav'd her golden hair.

And longer had she sung,—but with a frown
Revenge impatient rose;
He threw his blood-stain'd sword in thunder down,
And with a withering look
The war-denouncing trumpet took,
And blew a blast so loud and dread,
Were ne'er prophetic sounds so full of woe;
And ever and anon he beat
The doubling drum with furious heat;
And though sometimes, each dreary pause between,
Dejected Pity at his side
Her soul-subduing voice applied,
Yet still he kept his wild unalter'd mien,
While each strain'd ball of sight seem'd bursting from his head.

Thy numbers, Jealousy, to nought were fix'd;
Sad proof of thy distressful state!
Of differing themes the veering song was mix'd;
And now it courted Love, now raving called on Hate.

With eyes upraised as one inspired,
Pale Melancholy sat retired,
And from her wild sequester'd seat,
In notes by distance made more sweet,
Pour'd through the mellow horn her pensive soul;
And, dashing soft from rocks around,
Bubbling runnels join'd the sound.
Through glades and glooms the mingled measure stole,
Or o'er some haunted stream with fond delay,
Round an holy calm diffusing,
Love of peace, and lonely musing,
In hollow murmurs died away.

But O! how alter'd was its sprightlier tone,
When Cheerfulness, a nymph of healthiest hue,
Her bow across her shoulder flung,
Her buskins gemm'd with morning dew,
Blew an inspiring air, that dale and thicket rung;
The hunter's call to Faun and Dryad known!
The oak-crown'd sisters, and their chaste-eyed queen,
Satyrs and sylvan boys were seen
Peeping from forth their alleys green;
Brown Exercise rejoic'd to hear,
And Sport leapt up, and seiz'd his beechen spear.

Last came Joy's ecstatic trial;
He, with viny crown advancing,
First to the lively pipe his hand addrest,
But soon he saw the brisk awakening viol,
Whose sweet, enchanting voice he lov'd the best.
They would have thought who heard the strain
They saw in Tempé's vale her native maids,
Amidst the festal-sounding shades,
To some unwearied minstrel dancing,
While, as his flying fingers kiss'd the strings,
Love framed with Mirth a gay fantastic round:
Loose were her tresses seen, her zone unbound;
And he amidst his frolic play,
As if he would the charming air repay,
Shook thousand odours from his dewy wings.

O Music! sphere-descended maid,
Friend of pleasure, wisdom's aid,
Why, goddess, why, to us denied,
Lay'st thou thy ancient lyre aside?
As in that lov'd Athenian bower
You learn'd an all-commanding power,
Thy mimic soul, O nymph endear'd,
Can well recall what then it heard.
Where is thy native simple heart,
Devote to virtue, fancy, art?
Arise, as in that elder time,
Warm, energic, chaste, sublime!
Thy wonders, in that god-like age,
Fill thy recording sister's page—
'Tis said, and I believe the tale,
Thy humblest reed could more prevail,

Had more of strength, diviner rage,
Than all which charms this laggard age ;
E'en all at once together found,
Cecilia's mingled world of sound.
Oh ! bid our vain endeavours cease ;
Revive the just designs of Greece ;
Return in all thy simple state ;
Confirm the tales her sons relate !

*Elegiac Poetry.*—This is a mournful and plaintive, but yet tender and engaging, kind of poem. It was invented to mourn the death of a friend, but was afterwards made use of to express the complaints of lovers, or any other melancholy subject. In process of time, subjects of desire, expostulation, reproach, admonition, and almost every other were admitted into elegy ; funeral lamentations and affairs of love seem, however, most agreeable to its character, which is that of gentleness and tenuity. No epigrammatic points or conceits, nor, in short, any little ornament of any kind is admissible in this species of poetry ; they must give place to the nobler beauties of nature and the passions. Elegy rejects whatever is facetious, satirical, or majestic, and is content to be simple and unaffected ; yet in this humble state it is sweet and engaging, elegant and attractive. This poem may be adorned with frequent commiserations, complaints, exclamations, addresses to things or persons, short digressions, allusions, comparisons, and sometimes with short descriptions. The language should be free from any harshness, easy, perspicuous, tender and pathetic ; the numbers should be smooth and flowing, so as to captivate the ear with their uniform sweetness and delicacy. Of elegies on the subject of death, that by Mr. Gray, written in a country churchyard, is one of the best that is to be found in our language, and may be justly esteemed as a masterpiece ; but being almost universally known it would be superfluous to insert it here.

*Pastoral Poetry.*—This word takes its name from the Latin pastor, a shepherd ; the subjects being uniformly those of pastoral or rural life ; and the persons introduced either shepherds or other rustics. Pastoral poetry is not of very ancient origin. Figures and descriptions of a pastoral kind indeed occur in the earliest poems that have been handed down to us ; but these descriptions are incidental only ; and it is now allowed by all critics that pastoral poetry was not cultivated as a separate and distinct branch of the art till towns and cities had been built and inhabited, and men had become comparatively luxurious. Theocritus, who was the father or inventor of this kind of poetry, has been deservedly

esteemed by the best critics; and by some is preferred to all other pastoral writers, with perhaps the single exception of Gesner. Virgil succeeded Theocritus, and he has imitated him with great success. His first pastoral is generally allowed to be the most perfect. Spenser was the first of our countrymen who acquired any considerable reputation by this method of writing.

*Didactic*, or *Preceptive Poetry*.—The method of writing precepts in verse, and embellishing them with the graces of poetry, probably arose from a consideration of the frailties and perverseness of human nature; and was intended to engage the affections, in order to improve the mind and amend the heart. Didactic poetry, as distinguished from other species of poetry, which are intended by indirect methods to make useful impressions on the mind, openly professes its intention of conveying knowledge and instruction. It differs, therefore, in the form only, not in the scope and substance, from a philosophical, a moral, or a critical treatise in prose; but at the same time, by means of its form, it has several advantages over prose instruction. Of this kind of poetry the most celebrated pieces are Pope's Essay on Man, his Ethic Epistles, Blackmore's Creation, and part of Young's Night Thoughts.

The style of didactic poems should be rich, in order that the barrenness of the precept may be lost in the lustre of the language. "It ought," says Dr. Warton, "to abound in the most bold and forcible metaphors, the most glowing and picturesque epithets; it ought to be elevated and enlivened by pomp of numbers and majesty of words, and by every figure that can lift a language above the vulgar and current expressions." It has been observed that any thing in nature may be the subject of this poem. Some things, however, will appear to more advantage than others, as they give a greater latitude to genius, and admit of more poetical ornament. Natural history and philosophy are copious subjects; and in these precepts may be decorated with all the flowers of poetry.

*Descriptive Poetry*.—This can scarcely be said to denote any one particular class of poetic compositions, since most of the kinds we have named are in some measure descriptive, and yet there are very few poems which are purely descriptive. There are, however, some, such as Thomson's Seasons, or Milton's L'Allegro, more professedly descriptive than others, as description is their predominating and distinguishing characteristic. The other British poets who stand highest in this department are Ossian, Milton, Denham, Falconer, Grahame, and Scott.

The following is esteemed a beautiful example of descriptive poetry, extracted from "The Lady of the Lake," written by the last

mentioned eminent writer. It describes the interview between Fitzjames and Ellen, in the island of the lake.

"The western waves of ebbing day
Roll'd o'er the glen their level way;
Each purple peak, each flinty spire,
Was bath'd in floods of living fire;
But not a setting beam could glow
Within the dark ravines below;
Where twin'd the path, in shadow hid,
Round many a rocky pyramid,
Shooting abruptly from the dell
Its thunder-splinter'd pinnacle;
Round many an insulated mass,
The native bulwarks of the pass,
Huge as the tower, which builders vain
Presumptuous piled on Shinar's plain.
Their rocky summits, split and rent,
Form'd turret, dome, or battlement,
Or seem'd fantastically set
With cupola or minaret,
Wild crests as pagod ever deck'd,
Or mosque of eastern architect.
Nor were these earth-born castles bare,
Nor lack'd they many a banner fair;
For, from their shiver'd brows display'd
Far o'er the unfathomable glade,
All twinkling with the dew-drop sheen,
The briar-rose fell in streamers green,
And creeping shrubs of thousand dyes
Wav'd in the west-wind's summer sighs.
Boon nature scatter'd far and wild
Each plant or flower, the mountain's child—
Here eglantine embalm'd the air,
Hawthorn and hazel mingled there;
The primrose pale, and violet flower,
Found in each clift a narrow bower;
Fox-glove and night-shade, side by side,
Emblems of punishment and pride,
Group'd their dark hues with every stain
The weather-beaten crags retain;
With boughs that quaked at every breath,
Grey birch and aspen wept beneath;
Aloft, the ash and warrior oak
Cast anchor in the rifted rock;

And higher yet, the pine-tree hung
His shatter'd trunk, and frequent flung,
Where seem'd the cliffs to meet on high,
His bows athwart the narrow'd sky.
Highest of all, where white peaks glanced,
Where glistening streamers waved and danced,
The wanderer's eye could barely view
The summer heaven's delicious blue;
So wondrous wild, the whole might seem
The scenery of a fairy dream.
Onward, amid the copse 'gan peep
A narrow inlet still and deep,
Affording scarce such breadth of brim,
As served the wild-duck's brood to swim;
Lost for a space through thickets veering,
But broader when again appearing,
Tall rocks and tufted knolls their face
Could on the dark-blue mirror trace;
And farther as the hunter stray'd,
Still broader sweep its channel made.
The shaggy mounds no longer stood
Emerging from entangled wood,
But, wave-encircled, seem'd to float,
Like castle girdled with its moat;
Yet broader floods extending still,
Divide them from their parent hill,
Till each, retiring, claims to be
An islet in an inland sea.
And now, to issue from the glen,
No pathway meets the wanderer's ken,
Unless he climb, with footing nice,
A far projecting precipice.
The broom's tough roots his ladder made,
The hazel saplings lent their aid;
And thus an airy point he won,
Where, gleaming with the setting sun,
One burnish'd sheet of living gold,
Loch-Katrine lay beneath him roll'd;
In all her length far winding lay,
With promontory, creek, and bay,
And islands that, empurpled bright,
Floated amid the livelier light;
And mountains that, like giants, stand
To sentinel enchanted land.

High on the south, huge Benvenue
Down to the lake in masses threw
Crags, knolls, and mounds, confus'dly hurl'd,
The fragments of an earlier world;
A wild'ring forest feather'd o'er
His ruin'd sides and summit hoar,
While on the north, through middle air,
Ben-An heaved high his forehead bare.
From the steep promontory gazed
The stranger, raptured and amazed.
And "What a scene were here," he cried.
"For princely pomp or churchman's pride!
On this bold brow, a lordly tower;
In that soft vale, a lady's bower;
On yonder meadow, far away,
The turrets of a cloister grey.
How blithely might the bugle-horn
Chide, on the lake, the lingering morn!
How sweet, at eve, the lover's lute
Chime when the groves were still and mute!
And when the midnight moon should lave
Her forehead in the silver wave,
How solemn on the ear would come
The holy matin's distant hum;
While the deep peal's commanding tone
Should wake, in yonder islet lone,
A sainted hermit from his cell,
To drop a bead with every knell;
And bugle, lute, and bell, and all,
Should each bewildered stranger call
To friendly feast, and lighted hall.

Blithe were it then to wander here!
But now—beshrew yon nimble deer,—
Like that same hermit's, thin and spare
The copse must give my evening fare;
Some mossy bank my couch must be,
Some rustling oak my canopy.
Yet pass we that,—the war and chase
Give little choice of resting-place;
A summer night, in green-wood spent,
Were but to-morrow's merriment;
But hosts may in these wilds abound,
Such as are better miss'd than found;

To meet with highland plunderers here
Were worse than loss of steed or deer.
I am alone—my bugle strain
May call some straggler of the train ;
Or fall the worst that may betide,
Ere now this faulchion has been tried."
  But scarce again his horn he wound,
When lo ! forth starting at the sound,
From underneath an aged oak,
That slanted from the islet rock,
A damsel, guider of its way,
A little skiff shot to the bay,
That round the promontory steep
Led its deep line in graceful sweep,
Eddying in almost viewless wave,
The weeping willow twig to lave,
And kiss, with whispering sound and slow,
The beach of pebbles bright as snow.
The boat had touch'd this silver strand,
Just as the hunter left his stand,
And stood concealed amid the brake,
To view this Lady of the Lake.
The maiden paused, as if again
She thought to catch the distant strain,
With head up-raised and look intent,
And eye and ear attentive bent,
And locks flung back, and lips apart,
Like monument of Grecian art.
In list'ning mood, she seemed to stand
The guardian Naiad of the strand ;
  And ne'er did Grecian chisel trace
A Nymph, a Naiad, or a Grace,
Of finer form, or lovelier face !
What though the sun, with ardent frown,
Had slightly tinged her cheek with brown,—
The sportive toil, which, short and light,
Had dyed her glowing hue so bright,
Served too in hastier swell to show
Short glimpses of a breast of snow ;
What though no rule of courtly grace
To measured mood had trained her pace,—
A foot more light, a step more true,
Ne'er from the heath-flower dashed the dew

E'en the slight hare-bell raised its head,
Elastic from her airy tread;
What though upon her speech there hung
The accents of the mountain tongue,—
Those silver sounds, so soft, so dear,
The list'ner held his breath to hear.
A chieftain's daughter seemed the maid;
Her satin snood, her silken plaid,
Her golden brooch, such birth betray'd.
And seldom was a snood amid
Such wild luxuriant ringlets hid,
Whose glossy black to shame might bring
The plumage of the raven's wing;
And seldom o'er a breast so fair
Mantled a plaid with modest care;
And never brooch the folds combined
Above a heart more good and kind.
Her kindness and her worth to spy,
You need but gaze on Ellen's eye;
Not Katrine, in her mirror blue,
Gives back the shaggy banks more true,
Than every free-born glance confess'd
The guileless movements of her breast;
Whether joy danced in her dark eye,
Or woe or pity claimed a sigh,
Or filial love was glowing there,
Or meek devotion poured a prayer,
Or tale of injury called forth
The indignant spirit of the north.
One only passion, unrevealed,
With maiden pride the maid conceal'd,
Yet not less purely felt the flame;—
O! need I tell that passion's name?
Impatient of the silent horn,
Now on the gale her voice was borne:
"Father!" she cried;—the rocks around
Loved to prolong the gentle sound.
Awhile she paused, no answer came,—
"Malcolm, was thine the blast?"—the name
Less resolutely uttered fell;
The echoes could not catch the swell.
"A stranger I," the Huntsman said,
Advancing from the hazel shade.

The maid alarmed, with hasty oar,
Pushed the light shallop from the shore,
And, when a space was gained between,
Closer she drew her bosom's screen ;
(So forth the startled swan would swing,
So turn to prune his ruffled wing.)
Then safe, though fluttered and amaz'd,
She paus'd, and on the stranger gaz'd.
Not his the form, nor his the eye,
That youthful maidens wont to fly.
On his bold visage, middle age
Had slightly pressed its signet sage,
Yet had not quenched the open truth,
And fiery vehemence of youth ;
Forward and frolic glee was there,
The will to do, the soul to dare ;
The sparkling glance, soon blown to fire,
Of hasty love, or headlong ire.
His limbs were cast in manly mould,
For hardy sports, or contest bold ;
And though in peaceful garb array'd,
And weaponless, except his blade ;
His stately mien as well implied
A high-born heart, a martial pride,
As if a baron's crest he wore,
And sheath'd in armour trod the shore.
Slighting the petty need he show'd,
He told of his benighted road ;
His ready speech flow'd fair and free,
In phrase of gentlest courtesy ;
Yet seem'd that tone, and gesture bland,
Less used to sue than to command.
A while the maid the stranger eyed,
And re-assured, at last replied,
That highland halls were open still
To wilder'd wanderers of the hill.
" Nor think you unexpected come
To yon lone isle, our desert home ;
Before the heath had lost the dew,
This morn, a couch was pulled for you ;
On yonder mountain's purple head
Have ptarmigan and heath-cock bled,
And our broad nets have swept the mere
To furnish forth your evening cheer."—

"Now by the rood, my lovely maid,
Your courtesy has erred," he said;
"No right have I to claim, misplac'd,
The welcome of expected guest.
A wanderer here by fortune tost,
My way, my friends, my courser lost,
I ne'er before, believe me, fair,
Have ever drawn your mountain air,
Till on this lake's romantic strand,
I found a fay in fairy land."—
"I well believe," the maid replied,
As her light skiff approached the side;
"I well believe, that ne'er before
Your foot has trod Loch-Katrine's shore;
But yet, as far as yesternight,
Old Allan-bane foretold your plight,—
A grey-hair'd sire, whose eye intent
Was on the vision'd future bent.
He saw your steed, a dappled grey,
Lie dead beneath the birchen way;
Painted exact your form and mien,
Your hunting suit of Lincoln green,
That tassell'd horn so gaily gilt,
That faulchion's crooked blade and hilt,
That cap with heron's plumage trim,
And yon two hounds so dark and grim.
He bade that all should ready be,
To grace a guest of fair degree;
But light I held his prophecy,
And deemed it was my father's horn,
Whose echoes o'er the lake were borne."—
The stranger smiled:—"Since to your home,
A destin'd errant knight I come,
Announc'd by prophet sooth and old,
Doom'd, doubtless, for achievement bold,
I'll lightly front each high emprize,
For one kind glance of those bright eyes;
Permit me, first, the task to guide
Your fairy frigate o'er the tide."—
The maid, with smile suppress'd and sly,
The toil unwonted saw him try;
For seldom, sure, if e'er before,
His noble hand had grasp'd an oar;

Yet with main strength his strokes he drew,
And o'er the lake the shallop flew;
With heads erect, and whimpering cry,
The hounds behind their passage ply.
Nor frequent does the bright oar break
The dark'ning mirror of the lake,
Until the rocky isle they reach,
And moor their shallop on the beach.
  The stranger view'd the shore around;—
'Twas all so close with copse-wood bound,
Nor track nor path-way might declare
That human feet frequented there,
Until the mountain-maiden show'd
A clambering unsuspected road,
That winded through the tangled screen,
And open'd on a narrow green,
Where weeping birch and willow round
With their long fibres swept the ground.
Here, for retreat in dang'rous hour,
Some chief had fram'd a rustic bower.
  It was a lodge of ample size,
But strange of structure and device;
Of such materials, as around
The workman's hand had readiest found.
Lopped of their boughs, their hoar trunks bared,
And by the hatchet rudely squared,
To give the walls their destined height,
The sturdy oak and ash unite;
While moss and clay and leaves combin'd
To fence each crevice from the wind.
The lighter pine-trees, over head,
Their slender length for rafters spread,
And withered heath and rushes dry
Supplied a russet canopy.
Due westward, fronting to the green,
A rural portico was seen,
Aloft on native pillars borne,
Of mountain fir with bark unshorn,
Where Ellen's hand had taught to twine
The ivy and Idæan vine,
The clematis, the favour'd flower
Which boasts the name of virgin-bower,
And every hardy plant could bear
Loch-Katrine's keen and searching air

An instant in this porch she staid,
And gaily to the stranger said,
"On Heaven and on thy Lady call,
And enter the enchanted hall!"
"My hope, my heaven, my trust must be,
My gentle guide, in following thee."—
He crossed the threshold—and a clang
Of angry steel that instant rang.
To his bold brow his spirit rushed,
But soon for vain alarm he blushed,
When on the floor he saw displayed,
Cause of the din, a naked blade,
Dropped from the sheath, that careless flung
Upon a stag's huge antlers swung;
For all around, the walls to grace,
Hung trophies of the fight or chase:
A target there, a bugle here,
A battle-axe, a hunting spear,
And broad-swords, bows, and arrows store,
With the tusked trophies of the boar.
Here grins the wolf as when he died,
And there the wild-cat's brindled hide
The frontlet of the elk adorns,
Or mantles o'er the bison's horns;
Pennons and flags defaced and stained,
That blackening streaks of blood retained,
And deer-skins, dappled, dun, and white,
With otter's fur and seal's unite,
In rude and uncouth tapestry all,
To garnish forth the sylvan hall.
The wondering stranger round him gazed,
And next the fallen weapon raised;
Few were the arms whose sinewy strength
Sufficed to stretch it forth at length;
And as the brand he poised and swayed,
"I never knew but one," he said,
"Whose stalwart arm might brook to wield
A blade like this in battle field,"
She sighed, then smiled and took the word;
"You see the guardian champion's sword:
As light it trembles in his hand,
As in my grasp an hazel wand;
My sire's tall form might grace the part
Of Ferragus, or Ascabart;

But in the absent giant's hold
Are women now, and menials old."—
  The mistress of the mansion came,
Mature of age, a graceful dame;
Whose easy step and stately port
Had well become a princely court
To whom, though more than kindred knew,
Young Ellen gave a mother's due.
Meet welcome to her guest she made,
And every courteous rite was paid
That hospitality could claim,
Though all unasked his birth and name.
Such then the reverence to a guest,
That fellest foe might join the feast,
And from his deadliest foeman's door
Unquestioned turn, the banquet o'er.
At length his rank the stranger names,—
"The knight of Snowdoun, James Fitz-James
Lord of a barren heritage,
Which his brave sires, from age to age,
By their good swords had held with toil.
His sire had fallen in such turmoil,
And he, God wot, was forced to stand
Oft for his right with blade in hand.
This morning with Lord Moray's train
He chased a stalwart stag in vain,
Out-stripped his comrades, missed the deer,
Lost his good steed, and wandered here."—
  Fain would the knight in turn require
The name and state of Ellen's sire.
Well showed the elder lady's mien
That courts and cities she had seen;
Ellen, though more her look displayed
The simple grace of sylvan maid,
In speech and gesture, form and face,
Showed she was come of gentle race;
'Twere strange in ruder rank to find
Such looks, such manners, and such mind.
Each hint the knight of Snowdoun gave
Dame Margaret heard with silence grave;
Or Ellen, innocently gay,
Turned all inquiry light away.
"Wierd women we! by dale and down
We dwell afar from tower and town.

We stem the flood, we ride the blast,
On wandering knights our spells we cast;
While viewless minstrels touch the string,
'Tis thus our charmed rhymes we sing."—
She sung, and still a harp unseen
Filled up the symphony between.

SONG.

Soldier, rest! thy warfare o'er,
Sleep the sleep that knows not breaking;
Dream of battled fields no more,
Days of danger, nights of waking.
In our isle's enchanted hall,
Hands unseen thy couch are strewing,
Fairy strains of music fall,
Every sense in slumber dewing.
Soldier, rest! thy warfare o'er,
Dream of fighting fields no more;
Sleep the sleep that knows not breaking,
Morn of toil, nor night of waking.

"No rude sound shall reach thine ear,
Armour's clang, or war-steed champing;
Trump nor pibroch summon here
Mustering clan, or squadron tramping.
Yet the lark's shrill fife may come
At the day-break from the fallow,
And the bittern sound his drum,
Booming from the sedgy shallow.
Ruder sounds shall none be near,
Guards nor warders challenge here,
Here's no war-steed's neigh and champing,
Shouting clans or squadrons stamping."—

She paused—then, blushing, led the lay
To grace the stranger of the day;
Her mellow notes a while prolong
The cadence of the flowing song,
Till to her lips in measured frame
The minstrel verse spontaneous came.

SONG *continued.*

"Huntsman, rest! thy chase is done,
While our slumbrous spells assail ye,
Dream not, with the rising sun,
Bugles here shall sound reveillie.

Sleep! the deer is in his den;
Sleep! thy hounds are by thee lying;
Sleep! nor dream in yonder glen,
How thy gallant steed lay dying.
Huntsman, rest! thy chase is done,
Think not of the rising sun,
For at dawning to assail ye,
Here no bugles sound reveillie."

The hall was cleared—the stranger's bed
Was there of mountain heather spread,
Where oft an hundred guests had lain,
And dreamed their forest sports again.
But vainly did the heath-flower shed
Its moorland fragrance round his head;
Not Ellen's spell had lulled to rest
The fever of his troubled breast.
In broken dreams the image rose
Of varied perils, pains and woes:
His steed now flounders in the brake,
Now sinks his barge upon the lake;
Now leader of a broken host,
His standard falls, his honour's lost.
Then,—from my couch may heavenly might
Chase that worst phantom of the night!
Again returned the scenes of youth,
Of confident undoubting truth;
Again his soul he interchanged
With friends whose hearts were long estranged.
They come, in dim procession led,
The cold, the faithless, and the dead;
As warm each hand, each brow as gay,
As if they parted yesterday;
And doubt distracts him at the view,
O! were his senses false or true?
Dreamed he of death, or broken vow,
Or is it all a vision now?
At length, with Ellen in a grove,
He seemed to walk, and speak of love;
She listened with a blush and sigh,
His suit was warm, his hopes were high.
He sought her yielded hand to clasp,
And a cold gauntlet met his grasp:

The phantom's sex was changed and gone,
Upon its head a helmet shone;
Slowly enlarged to giant size,
With darkened cheek and threatening eyes,
The grisly visage, stern and hoar,
To Ellen still a likeness bore.—
He woke, and panting with affright,
Recalled the vision of the night.
The hearth's decaying brands were red,
And deep and dusky lustre shed,
Half showing, half concealing all
The uncouth trophies of the hall.
Mid those the stranger fixed his eye
Where that huge faulchion hung on high,
And thoughts on thoughts, a countless throng,
Rush'd, chasing countless thoughts along,
Until the giddy whirl to cure,
He rose and sought the moon-shine pure.
The wild rose, eglantine, and broom,
Wasted around their rich perfume;
The birch-trees wept in fragrant balm,
The aspens slept beneath the calm;
The silver light, with quivering glance,
Played on the water's still expanse,—
Wild were the heart whose passion's sway
Could rage beneath the sober ray!
He felt its calm, that warrior guest,
While thus he communed with his breast:
"Why is it at each turn I trace
Some memory of that exiled race?
Can I not mountain maiden spy,
But she must bear the Douglas eye?
Can I not view a highland brand,
But it must match the Douglas hand?
Can I not frame a fevered dream,
But still the Douglas is the theme?
I'll dream no more—by manly mind
Not even in sleep is will resign'd.
My midnight orison said o'er,
I'll turn to rest, and dream no more"
His midnight orisons he told,
A prayer with every bead of gold,
Consigned to heaven his cares and woes,
And sunk in undisturbed repose;

Until the heath-cock shrilly crew,
And morning dawned on Ben-venue.

## VERSIFICATION.

Although it has been explained that a regular measure does not constitute of itself true poetry, yet there are certain principles of versification which it is of importance to attend to whenever poetry assumes the form of measure.

*Versification* is the arrangement of a certain number and variety of syllables, according to certain laws.

*Rhyme* is the correspondence of the last sound of one verse, to the last sound or syllable of another.

*Feet* and *pauses* are the constituent parts of verse.

*Feet.*—A certain number of syllables connected form a foot. They are called feet, because it is by their aid that the voice, as it were, steps along through the verse, in a measured pace; and it is necessary that the syllables which mark this regular movement of the voice, should in some manner be distinguished from the others. This distinction was made among the ancient Romans, by dividing their syllables into long and short, and ascertaining their quantity by an exact proportion of time in sounding them. In English, syllables are divided into accented and unaccented; and the accented syllables being as strongly distinguished from the unaccented by the peculiar stress of the voice upon them, are equally capable of making the movement, and pointing out the regular paces of the voice, as the long syllables were by their quantity among the Romans. When the feet are formed by an accent on vowels, they are exactly of the same nature as the ancient feet, and have the same just quantity in their syllables. So that, in this respect, we have all that the ancients had, and something which they had not. We have, in fact, duplicates of each foot, yet with such a difference as to fit them for different purposes, to be applied at our pleasure.

Every foot has, from nature, powers peculiar to itself; and it is upon the knowledge and right application of these powers, that the pleasures and effect of numbers chiefly depend.

All feet used in poetry consist either of two or of three syllables, and are reducible to eight kinds; four of two syllables, and four of three, as follows:

| *Dissyllables.* | *Trissyllables.* |
|---|---|
| A Trochee — ⏑ | A Dactyl — ⏑ ⏑ |
| An Iambus ⏑ — | An Amphibrach ⏑ — ⏑ |
| A Spondee — — | An Anapæst ⏑ ⏑ — |
| A Pyrrhic ⏑ ⏑ | A Tribrach ⏑ ⏑ ⏑ |

A trochee has the first syllable accented, and the last unaccented. An iambus has the first syllable unaccented, and the last

accented. A spondee has both the words or syllables accented. A pyrrhic has both the words or syllables unaccented. A dactyl has the first syllable accented, and the two latter unaccented. An amphibrach has the first and last syllables unaccented, and the middle one accented. An anapæst has the first two syllables unaccented, and the last accented. A tribrach has all its syllables unaccented.

Some of these feet may be denominated principal feet; as pieces of poetry may be wholly, or chiefly formed of any of them. Such are the iambus, trochee, dactyl, and anapæst. The others may be termed secondary feet; because their chief use is to diversify the numbers, and to improve the verse.

*Poetical pauses.*—There are two sorts of pauses, one for sense, and one for melody, perfectly distinct from each other. The former may be called sentential, the latter, harmonic pauses.

The sentential pauses are those which are known to us by the name of stops, and which have names given them; as the comma, semicolon, colon, and period, hereafter to be explained.

The harmonic pauses may be subdivided into the final pause and the cæsural pause. These sometimes coincide with the sentential pause, sometimes have an independent state, that is, exist where there is no stop in the sense.

The final pause takes place at the end of the line, closes the verse, and marks the measure: the cæsural divides it into equal and unequal parts.

The final pause preserves the melody, without interfering with the sense; for the pause itself perfectly marks the bound of the metre, and being made only by a suspension of the voice, not by any change of note, it can never affect the sense.

The cæsura is commonly on the fourth, fifth, or sixth syllable of heroic verse.

On the fourth syllable, or at the end of the second foot: as,

The silver eel″ in shining volumes roll'd,
The yellow carp″ in scales bedropp'd with gold.

On the fifth syllable, or in the middle of the third foot: as,

Round broken columns″ clasping ivy twin'd;
O'er heaps of ruin″ stalk'd the stately hind.

On the sixth syllable, or at the end of the third foot: as,

Oh say what stranger cause″ yet unexplor'd,
Could make a gentle belle″ reject a lord.

Melody, harmony, and expression, are the three great objects of poetical numbers. By melody, is meant, a pleasing effect produced on the ear, from an apt arrangement of the constituent parts of verse according to the laws of measure and movement. By

harmony, an effect produced by an action of the mind, in comparing the different members of a verse with each other, and perceiving a due and beautiful proportion between them. By expression, such a choice and arrangement of the constituent parts of verse, as serve to enforce and illustrate the thought or the sentiment.

We shall consider each of these three objects in versification, both with respect to the feet and the pauses.

With regard to melody; from the examples given it is evident that a considerable portion of melody is found in each of them, though in different degrees. Verses made of pure iambics have an excellent melody.

That the final and cæsural pauses contribute to melody, cannot be doubted by any person who reviews the instances, which we have already given of those pauses. To form lines of the first melody, the cæsura must be at the end of the second, or the third foot, or in the middle of the third.

With respect to harmony; verses composed of iambics have indeed a fine harmony; but as the stress of the voice, in repeating such verses, is always in the same places, that is, on every second syllable, such a uniformity would disgust the ear in a long succession; and therefore such changes were sought for, as might introduce the pleasure of variety, without prejudice to melody; or which might even contribute to its improvement. Of this nature was the introduction of the trochee, to form the first foot of an heroic verse: as,

Fāvoŭrs tŏ nōne, tŏ āll shĕ smīles ĕxtends,
O'ft she rejécts, but never once offends.

Another change admitted for the sake of variety, without prejudice to melody, is the intermixture of pyrrhics and spondees; in which, two impressions in the one foot make up for the want of one in the other; and two long syllables compensate two short ones, so as to make the sum of the quantity of the two feet equal to two iambics.

Ŏn thĕ grēen bānk tŏ lōok ĭntŏ thĕ clēar
Smōoth lāke thăt tŏ mē seēm'd another sky.
Stōod rūl'd stōod vāst ĭnfĭnitŭde cŏnfīn'd.

We have before shown that the cæsura improves the melody of verse; and we shall now speak of its other more important office, that of being the chief source of harmony in numbers.

The first and lowest perception of harmony, by means of the cæsura, arises from comparing two numbers of the same line with each other, divided in the same manner to be seen in the instances before mentioned; because the beauty of proportion in the numbers,

according to each of these divisions, is found in nature; being as one to two—two to three—or three to two.

The next degree arises from comparing the members of a couplet, or two contiguous lines: as,

> See the bold youth" strain up the threat'ning steep,
> Rush thro' the thickets," down the valleys sweep.

Here we find the cæsura of the first line at the end of the second foot; and in the middle of the third foot in the last line.

> Hang o'er their coursers' heads" with eager speed,
> And earth rolls back" beneath the flying steed.

In this couplet, the cæsura is at the end of the third foot in the first line; and of the second in the latter line.

The next perception of harmony arises from comparing a greater number of lines, and observing the relative proportion of the couplets to each other, in point of similarity and diversity, as:

> Thy forests Windsor" and thy green retreats,
> At once the monarch's" and the muse's seats,
> Invite my lays." Be present Sylvan maids,
> Unlock your springs," and open all your shades.
>
> Not half so swift" the trembling doves can fly,
> When the fierce eagle" cleaves the liquid sky;
> Not half so swiftly" the fierce eagle moves,
> When through the clouds" he drives the trembling doves.

The last object in versification regards expression. When men express their sentiments by words, they naturally fell into that sort of movement of the voice which is consonant to that produced by the emotion in the mind; and the dactylic or anapæstic, the trochaic, iambic, or spondaic, prevails even in common discourse, according to the different nature of the sentiments expressed. To imitate nature, therefore, the poet, in arranging his words in the artificial composition of verse, must take care to make the movement correspond to the sentiment, by the proper use of the several kinds of feet; and this is the first and most general source of expression in numbers.

That a judicious management of the feet and pauses may be peculiarly expressive of particular operations and sentiments, will sufficiently appear to the learner, by a few select examples under each of those heads.

In the following instances, the vast dimensions of Satan are shown by an uncommon succession of long syllables, which detain us to survey the huge arch fiend, in his fixed posture:—

> Sō strētch'd oūt hūge in lēngth the ārch fiend lāy.

The next example affords instances of the power of a trochee beginning a line when succeeded by an iambus:

——————— and sheer within
Līghts ŏn hĭs fēet: as when a prowling wolf
Leaps o'ĕr thĕ fénce wĭth eāse ĭntŏ thĕ fōld.

The trochee which begins the line shows Satan in the act of lighting: the iambus that follows, fixes him—"Līghts ŏn hĭs fēet."

The same artifice, in the beginning of the next line, makes us see the wolf—"leap o'er thĕ fence." But as the mere act of leaping over the fence is not the only circumstance to be attended to, but also the facility with which it is done, this is strongly marked, not only by the smooth foot which follows—"wĭth ĕase" —itself very expressive, but likewise by a pyrrhic preceding the last foot—"intō thĕ fōld"—which indeed carries the wolf—"with ĕase ĭntŏ thĕ fōld."

We shall close the subject, with an example containing the united powers of many of the principles which have been explained.

Dīre wăs the tóssĭng," dēep the grōans ' Dĕspāir"
Tended the sick" búsiest from cŏúch to coúch"
And ōvĕr thĕm trĭúmphánt deăth" hĭs dárt"
Shook" bŭt dĕlāy'd tŏ strīke.

# CHAPTER XVI.

## THE ARTS.

In the present state of the world the arts and sciences are becoming daily of more importance, and it is therefore more needful than ever to form just ideas respecting them.

The term science is more particularly used for a systematic view of the principles of any branch of knowledge, comprehending the doctrine, reason, and theory, of the thing, without any immediate application of it to any uses or offices of life.

Art is used for science or knowledge, reduced into practice. The term more particularly denotes a certain system or collection of rules, precepts, and inventions or experiments, which, being duly observed, make the things a man undertakes succeed, and render them advantageous and agreeable. In this sense, art is opposed to science, which is a collection of speculative principles and conclusions.

As all arts have this common property, that they respect human life, it is evident that some contribute to its necessities, as medicine and agriculture; and others to its elegance, as music, painting, and poetry. The former seem to have been prior in time to the latter. Men must naturally have consulted how to live, and to support themselves, before they began to deliberate how to render life agreeable. Indeed this is confirmed by fact, as no nation has been known so barbarous and ignorant, as not, in some degree, to have cultivated the rudiments of these necessary arts; and hence possibly they may appear to be more excellent and worthy, as having claim to a preference derived from their seniority. The arts, however, of elegance are not destitute of pretensions, if it be true, that we were formed for something more than mere existence. Nay farther, if well being be clearly preferable to mere being, and this without the other be contemptible, they may have reason perhaps to aspire even to a superiority.

Most of the arts that are necessary to the subsistence, or conducive to the convenience and comfort of mankind, have had a very early origin. Some of them may be considered as almost coeval with the human race; and others have sprung up at

# DRAWING.

Fig. 2

Fig. 5.

Fig. 1.



Fig. 4.

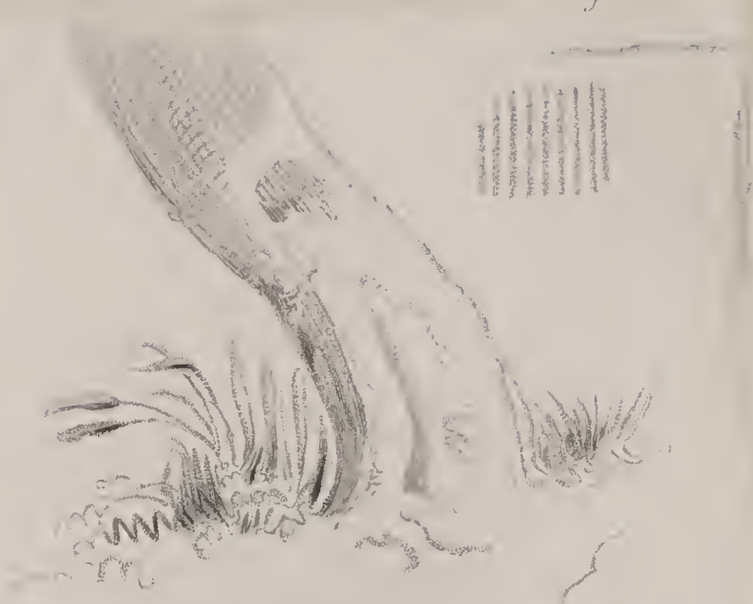




Fig. 6.

Fig. 3.



Fig. 7.





Fig. 8.

Fig. 11.

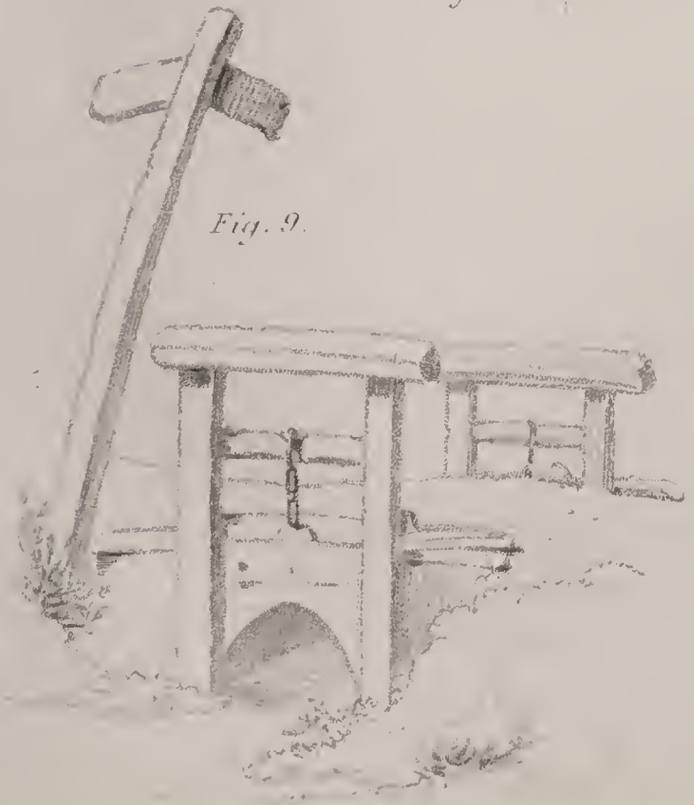


Fig. 9.

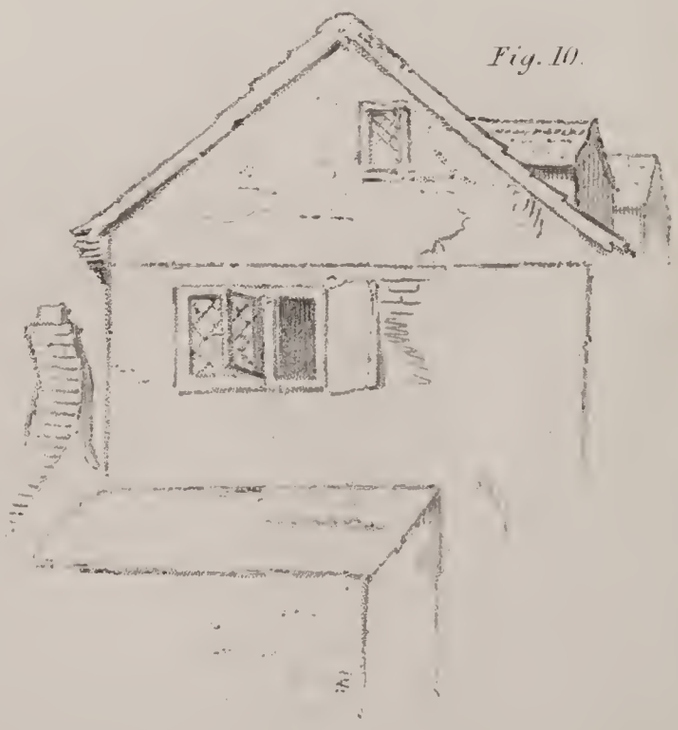


Fig. 10.

different periods, and in various nations so remote, that the history of their rise, and of their progress for many ages, is involved in an obscurity which precludes any satisfactory investigation. The want of food, raiment, and habitations, would naturally suggest a variety of inventions; and when the first and scanty demands of necessity were satisfied, mankind would proceed by further discoveries to improve the ordinary means of supply, and at length to ameliorate and embellish the condition which providence had assigned them. But for a long time their real exigencies would be few, and their views and wishes very limited; and of course their progress in improvement would be proportionably slow and tedious.

In a more advanced state of society, their necessities and desires would be multiplied, and they would devise new methods of supplying and gratifying them; so that the arts they had already invented would be improved, and new ones would be discovered. At last, as a change of circumstances occurred, or some accident suggested the hint or afforded opportunity, they would proceed from the invention of the necessary and mechanical arts to those that contributed to elegance and ornament, as well as superior accommodation. As to the inventions and discoveries of the early ages, nothing certain is known. Those arts that may be referred to the class of such as are most necessary and useful, were the productions of periods when men had little acquaintance with letters, and when they possessed no certain mode of transmitting an account of them to succeeding generations. The records of tradition are obscure, doubtful, or fabulous; and other modes of conveyance are subject to corruptions and mutilations in the lapse of many ages. To this purpose, it may be alleged, that many passages in the works of Pliny, who appears to have been industrious in collecting whatever he thought to be useful or curious, and to have been as desirous of communicating knowledge as he was industrious in acquiring it, have suffered in this way to such a degree, that some of them have not been satisfactorily illustrated even by the best commentators.

It is universally allowed, however, that the arts had their rise in the East, and that they were conveyed from thence to the Greeks, and from them to the Romans. The Romans, indeed, seem to have been chiefly indebted to the Greeks, by whom they were excelled in point of invention. The Romans acknowledged this superiority, for they sent their youth to Greece in order to finish their education; and from this circumstance we may infer, that they considered that country as the seat of the arts and sciences, and as a school where genius would be excited by the

most finished models, and the taste corrected and formed. Pliny and other writers have, nevertheless, given hints which lead us to conclude, that the Romans possessed a more extensive acquaintance with the arts, than the moderns are perhaps willing to allow, and that some inventions regarded as new, may be only old ones revived, and again applied to practice. When Rome, abandoned to luxury and vice, became an easy prey to those hordes of barbarians who overspread the empire, her arts shared in the general wreck, and were either entirely lost, or for a considerable time forgotten. The deplorable state of ignorance in which Europe was afterwards plunged during several centuries retarded their revival; and it was not till a late period, when favoured and protected by a few men of superior genius, that they began again to be cultivated.

It cannot, however, be denied, that several important discoveries, altogether unknown to the ancients, which must have had considerable influence on the general state of society, were made in ages which can hardly be exempted from the appellation of barbarous. Of this kind were the invention of paper, painting in oil, the mariner's compass, gunpowder, printing, and engraving on copper. After the invention of the compass and printing, two grand sources were opened for the improvement of science. As navigation was extended, new objects were discovered to awaken the curiosity, and excite the attention of the learned; and the ready means of diffusing knowledge, afforded by the press, enabled the ingenious to make them publicly known. Ignorance and superstition, the formidable enemies of philosophy in every age, began to lose some of that power which they had usurped; and different states, forgetting their former blind policy, adopted improvements, which their prejudices before condemned.

In countries, however, where civil and ecclesiastical tyranny prevailed, the progress of the useful and elegant arts was slow, and struggled with many difficulties. Particular events, indeed, have occurred in all ages and nations, which have roused the exertions of genius, and furnished occasion for making important and useful discoveries. The history of Greece and Rome, and even of modern Europe, will afford many obvious facts that seem to confirm and illustrate this observation.

Arts have been divided into liberal and mechanical.

Liberal or polite arts, are those that are noble and ingenious, or which are worthy of being cultivated without any immediate regard to the lucre arising from them. They are such as depend more on the labour of the mind than on that of the hand; or, that consist more in speculation than operation, and have a greater

regard to amusement and curiosity than necessity. They may be said indeed to partake of the character of science, as much as art. Such are poetry, music, drawing, painting, the military art, architecture, navigation, &c.

Mechanical arts, are those wherein the hand and body are more concerned than the mind, and which are chiefly cultivated for the sake of the profit attending them. Of which kind are most of those which furnish us with the necessaries of life, and are popularly know by the name of trades and manufactures. Such are weaving, turnery, brewing, masonry, clock-making, carpentry, joinery, printing, &c.

The mechanical arts in general can only be learned by practice, but there are some of the liberal arts respecting which some observations may be useful. From the numerous branches of the liberal arts to which allusion has been made, we select the following as specimens.

## Section I.—Drawing and Perspective.

Drawing in its general sense is the accurate representation and just symmetry of forms and proportions. This term is usually applied to the lighter sketches in pencil, chalk, Indian ink, or water-colours; the more permanent works of this nature in oil, crayons, &c. are usually ranked under the designation of paintings, Drawing may justly be considered as the basis of painting; for it is but labour lost, when the painter endeavours to disguise by ingenious artifices of colour, the defects of forms which are fundamentally incorrect and incoherent.

There is scarcely a style of modern drawing or colouring, which was not known to the Greeks; who united to these exquisite accomplishments all the collateral ramifications of embroidery, tapestry, brocading, damask work, and every species of mosaic, which, according to Pliny, who has compiled a history of the arts, had a different denomination assigned to each.

From whom the Greeks derived their first knowledge of designing, we know not. According to the Roman annalist above alluded to, Telephanes of Sicyon, and Ardices of Corinth, equally contended for the honour; but the species of design he first adverts to, an invention, indeed, prior to the era that can be ascribed to these artists, is the rude method of tracing the mere outline of a shadow when projected upon a wall, a method which still exists among ourselves.

This species of drawing, and probably painting, strictly so called, must have been of very early origin indeed. Embroidery

and tapestry, in which colours were introduced, we know to have been of high antiquity, even among the Jews and Babylonians; but both these arts presuppose the existence of outlines, or line drawings, for the artists necessarily worked from a pattern.

To the mere outline, the Corinthian or Sicyonian artist, according to Pliny, added strokes to the interior, a style which is still retained, whenever the quill or the crayon is employed. Our historian then advances to a second epoch, regarding the mere outline with internal strokes as one and the smae. The second epoch of Pliny comprises the use of a single colour alone, and its style was in consequence denominated by the Greeks, Monochromaton, and is still retained in modern times under the appellation of cameo. This seems to have been a great improvement upon the style of stroke, or linear drawing; which must have wanted relief, and been incapable of exhibiting the gradual softness, recession, and rotundity, which are everywhere to be met with in nature. This alone is to be obtained, in any high degree, by the introduction of colour. It is to the harmonious combination of tints apparently opposite in which the black alone maintains the supremacy, that the Italians have given the name of chiaro-scuro, or clear obscure. From this advantage gained to the art, it is easy to trace its ascent to the life and harmony of colouring, properly so called—to the eras of Panænus, Polygnotus, and Zeuxis—to the exquisite paintings of the Pœcile—and the meridian age of Apelles, who, in the language of Cicero, consummated this noble invention.

Amidst many other proofs of the ingenuity of the ancients which are totally lost to us, is to be enumerated their mode of encaustic painting, as well in wax as on ivory. Of the inventors of these very curious arts we know nothing. The style of painting in wax was in common use at least as early as the age of Anacreon, who, as the friend of Polycrates of Samos, must have flourished upwards of five hundred years anterior to the Christian era.

Amongst the painters of antiquity, Apelles is recorded as the most eminent for the beauty of his drawing. Since the revival of the arts in Italy, Michael Angelo appears the most learned draughtsman, Raffaelle the most correct and graceful. The Roman and Florentine schools have excelled all others in this fundamental art of painting. Of the former, Raffaelle, Giulio Romano, Polydore, and their scholars; of the latter, M. Angelo, Leonardo da Vinci, and Andria del Sarto, have been the most excellent. In the Bolognese school Annibal Caracci is particularly distinguished. In the French school, Poussin, Le Sueur, and Le Brun; in our own, Mortimer, Barry, and West, have been much celebrated.

The study of this art has at all times been held in high estimation by all polished nations, not only on account of the delightful amusement it is capable of affording, but from the superior consideration of its influence on the intellect and judgment, by forming the eye, and with it the mind, to habitual discriminations of dimension, regularity, proportion, and order. There is on record, a saying of Thomas, earl of Arundel, lord marshal of England, "that one who could not draw a little would never make an honest man."

Having briefly traced the history of this art, we proceed to give a few plain simple rules which may be useful in practice.

And first as to the materials most requisite for the young draughtsman, the following are the principal.

Drawing boards for fixing the paper upon, so that it may not shift, and also for straining it, to prevent the colours, when laid wet upon the paper, from causing it to swell up, so as to be uneven. The simplest sort is made of deal-board, framed square, with a strong piece across each end, to prevent warping.

The best kind of drawing boards, however, are made with a frame, and a movable panel, upon which the paper is simply put wet, and then forced into the frame, where it is confined by wedges at the back.

Parallel rulers are for drawing parallel lines very readily; they are made of two pieces of ebony fastened together by brass bars, so as always to move parallel to each other. They may be bought of different kinds and prices, at the mathematical instrument makers.

T squares are rulers made in the form of the letter T, which are used with the drawing-boards; the short end, called the stock, being applied to the edge of the board, so as to slide forwards and backwards, while the long part, called the blade, is used for drawing lines by. These are more convenient than parallel rulers, when a drawing board is used, as by them you draw lines at right angles to each other at once, without using the compasses.

Dividing-compasses are instruments of brass and steel, for dividing lines, and laying down measures from scales, &c. They are generally sold in cases, containing also a steel pen, for drawing lines cleaner than can be done by a common pen; and points with a black-lead pencil, for putting into the compasses, when circles are to be described.

Black-lead pencils are of various degrees of hardness. and are termed—

F, fine.
H, hard.
H B, hard and black.
B, black.
B B, double black.

The best were formerly made by Brookman and Langdon, but other makers have produced them latterly of excellent quality.

Indian rubber, or elastic gum, as it is also called, is a substance very much like leather, which has the curious and useful property of erasing or defacing lines, drawn with black-lead; it is therefore much used for this purpose.

Indian ink comes from China, where it is used for common writing, which is performed with a brush instead of a pen. It is a solid substance, of a brownish black colour, and the composition is not known, but is conjectured to be the gall of a species of cuttle-fish. When ground up with water upon a clean tile or earthenware plate, it may be made either lighter or darker, as required, by adding to it more or less water. The best Indian ink is always stamped with Chinese characters.

Hair-pencils are made of camel's hair, put into a goose or swan's quill. To choose these, moisten them a little, and if they come to a point without splitting, they are good; if they do not, they are not fit for drawing with.

Charcoal is used for slightly sketching the outlines of figures, in order to get the proportions, previous to making a drawing in chalk. The best charcoal for this purpose is that of the willow; it is cut into slips, and the strokes made with it, may be easily rubbed out with a feather of a goose's or duck's wing.

Black chalk is a fossil substance, resembling slaty coal, which is cut into slips for drawing. It is generally used in an instrument called a port-crayon, which is made either of steel or brass. It is much employed for drawing figures, and is the best substance for this purpose, in making drawings from plaster, or after the life.

Drawing paper, made without any wire-marks, called wove paper, is the best for this purpose. It is made of various sizes and thicknesses, as Royal, Imperial, &c.; the thickness and quality is generally proportionate to the size.

Middle tint paper, is of a brownish or of a grey colour, which is used for drawing upon with black and white chalk. Being of a dark colour, the strokes of the white chalk are distinctly seen; and it saves a great deal of time in making drawings, as the tint of the paper answers for the half-shadow, so that all that is necessary to be done is to lay in the dark shadows and the lights.

## LANDSCAPES.

Under this head may be included a great variety of natural objects, and in infinitely diversified combinations and groupings; as buildings, rocks, trees, &c. Landscapes may be considered

in two ways; either as faithful delineations or portraits of places, which perhaps may be more properly called topographical landscapes; or as productions of the imagination or fancy, in which the artist has selected, like the ancient Greek sculptors, the beauties of various parts, and combined them into a perfect whole.

In drawing topographical representations, the strictest attention should be paid to truth in those objects which form the subject of the picture. In mountainous countries, the knowledge of the geologist, and among buildings the skill of the architect and antiquarian, will be found useful to the artist. His business is to detail facts; and in drawing from nature, his taste as an artist should carry him no farther than to choose the point of view most proper for giving an impressive and characteristic representation of his object. After the sketch or study is made from nature, it is the business of the artist to compose it into a picture; or to invent such a sky, foreground, and figures, as shall combine together with the principal object to complete the character, and to form the whole.

With regard to the poetical artist, almost every one has his peculiar ideas of perfection in the grand style of landscapes; and as few have attempted it, and still fewer succeeded, it is difficult to point out any productions that may serve as models. The works of Poussin, Caracci, Titian, and others of the Italian school, will furnish the student with many useful hints; but he must take care that in studying them, he do not become an imitator and mannerist, and lose sight of nature, the contemplation of which alone will give a stamp of originality to his compositions.

In pursuing the practice of landscape drawing, it has been recommended to the learner to begin by copying some sketch which contains only one or two simple objects, as an old wall, stone cross, &c.; afterwards to proceed by degrees to more extensive combinations. In this early state, the pupil will only require black-lead pencils, drawing paper, and Indian rubber, but afterwards other materials will be needful.

The first thing to be learned is to draw a correct outline, which must be completed before the drawing is put into shade. Most persons who draw for the first time, make continued hard lines; the consequence of this is, that they can never draw a perpendicular or horizontal line without the aid of a ruler, which must never be used in picturesque drawing. Nor will it be required, if the following simple rule is attended to: place one dot immediately above another, at any distance you please, and draw a number of small dots or very short lines from one to the other;

practise lines of this kind on waste paper, till you can make a perpendicular line with tolerable certainty.

You may then proceed with all the outline of the sketch in the same manner, till the whole is completed, and ready to be put in the shade. It is this which gives an appearance of substance, distance, and distinction, to every object, whether animate or inanimate. The shades may be laid on either with black lead, chalk, or Indian ink, but the great improvements and variety in the manufacture of the black-lead pencil, have in a considerable degree superseded the use of chalk and Indian ink, in landscape drawing.

Specimens of perpendicular shades are shown in plate drawing, fig. 1; of diagonal shades in fig. 2; and cross-shading, fig. 3. In distributing the light and shade, it must first be ascertained from what point, and in what direction, the light falls upon the objects which the learner is delineating, that all the lights and shades may be placed in that direction through the whole piece. If the light falls sideways on the picture, he must make that side which is opposite to it lightest, and that side which is farthest from it darkest. Observe also, that a strong light requires a strong shade, a fainter light a fainter shade; and that a balance must be preserved through the piece between the light and shade. It should be remarked also, that objects should appear more or less confused or clear, according to their situations. Those that are very distant, weak, faint, and confused; those that are near on the foreground, clear, strong, and accurately finished. Fig. 4, is an example of an elementary sketch.

As the forms of the different objects to be represented in landscapes vary very much from each other, it is needful also to vary the kind of outline. In sketching rocks and hills, their forms, proportions, and irregularities, should be carefully imitated, and nicely distinguished; but in sketching a tree, where it is impossible that a mere outline should convey the exact form of its various minute parts, such a method should be adopted as appears best calculated to express its general appearance. Care should be taken in trees on the foreground to adapt the style of drawing to the nature of their foliage, whether oak, ash, &c. Fig. 5, represents a trunk of a tree; fig. 6, a branch; and figs. 7 and 8, different kinds of foliage.

The foliage of trees is made of irregular curved lines, formed into semicircles, angles, or points, according to the character of the tree; and as these forms present themselves to the eye in various directions, it is necessary that you should acquire great facility of expressing them, which ever way they may appear.

The outline of the architectural parts of a subject should be

# PERSPECTIVE.

Fig. 1.



Fig. 2.

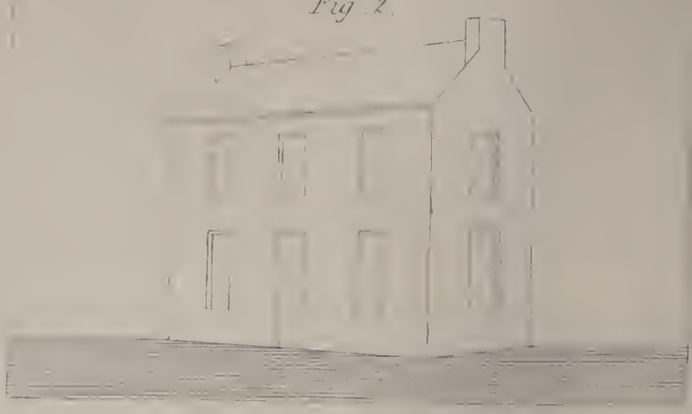


Fig. 3.



Fig. 4.



Fig. 5.



Fig. 8.

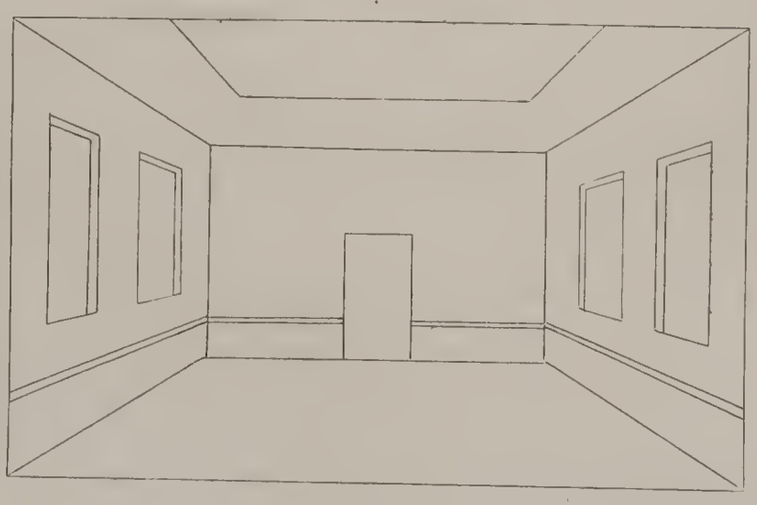


Fig. 6.

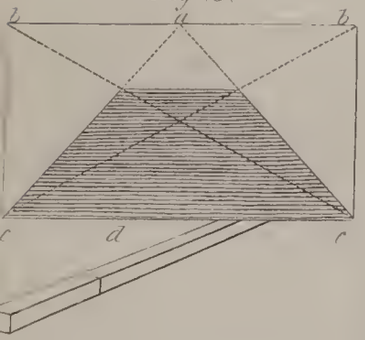
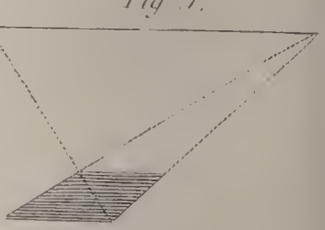



Fig. 7.



drawn with a neat even stroke; and where any set of objects, such as doors and windows, fig. 4, is to be taken, faint lines should be drawn, in a proper degree of inclination from the top and bottom, and then divided into equal portions for the breadths, or else there is danger of great irregularity. Figs. 9 and 10 represent some of the most easy combinations in landscape drawing.

The study of the human figure in drawing, has justly been considered as ranking first in importance, and has often been attempted first in order of time. But in an elementary work like the present, it is impossible to give any correct idea of this style of drawing. Animals are, however, often introduced in drawing, therefore in fig. 11 is shown a specimen of the head of a horse.

It is impossible to proceed far in landscape drawing without some knowledge of the elements of perspective; the following outline of this important part of drawing may be useful.

## PERSPECTIVE.

Perspective is the art of drawing the picture, or representation of any visible object on a plane surface, in such a manner as it would appear on some transparent surface, interposed between an object and the eye of an observer.

All correct perspective has geometry for its foundation, and consequently truth for its support. It consists in determining and fixing the geometric situation of points in a picture, which points connected, produce lines, and lines (straight and curvilineal) constitute the first principles of a picture, the grand outline and structure which the painter is to dress with light and shade. Hence it is perceivable that the mathematician directs the outlines, but does not finish the piece; and on the other hand, the painter cannot make a sure beginning without the mathematician's rules.

We do not mean to say that these rules are to be applied to all the smaller hollows and prominences of objects, for these, as well as some other of the minutiæ of art, are to be determined by the eye, and drawn by a steady hand. A landscape painter may study nature in the inmost recesses of a forest, and there store his mind with models of trees and foliage, and by such means become qualified to make a random picture. But if he would go farther, and represent a true portraiture of an avenue of these subjects, he must study the perspective diminution of the most remote parts thereof, as well as their relative positions, or his proposed picture will become an anamorphosis. He may give a tolerably correct

view of one side of a building, but he can do no more; if he would give the representation of more than one side, he must have recourse to the principles of perspective.

The practical rules of perspective are in great measure applied to the delineation of architectural bodies, and other right lined figures; and a knowledge of the general laws of this science is sure to inform the judgment of the manner in which lines should run, whereto they should tend, and where terminate, so as to produce the desired effect.

All architectural drawings may be exhibited in two ways, either as elevations or in perspective. The former are used by architects as modes or plans for their work, and in these the rules of perspective are not attended to. This will be made more evident by a reference to Plate *Perspective*, figs. 1, 2. In drawing an elevation of a building, the artist is supposed to stand directly in front of it, in which position neither of the sides can be seen; this will be understood by looking at fig. 1, which is an elevation; but by moving towards the end of the house, the front and one side is seen, as in fig. 2, in which the same building is exhibited in perspective.

In every perspective drawing there are several points to which the learner must pay particular attention; as the base line, the horizontal line, the point of sight, and the point of distance.

The *base line* is the line which bounds the bottom of the picture, and in landscape drawing is often termed the terrestrial, or ground line. The *horizontal line* is always parallel, or even with the base line; and indicates in what part the representation of the natural horizon should appear. If you stand on the sea-shore looking towards the ocean, in the extreme distance, the sky and water appear to meet together, and the line formed by the termination of the view of the water is called the horizon. You will find that this line is always exactly the same height as your eye; this you can prove by holding a stick some distance from you, even with your eye, and it will completely hide the horizon from your view. Nor does it make any difference if you are lying on the ground, or standing on an eminence, the horizon will of course be higher or lower, but in all cases it will be even with your eye.

In fig. 3, the horizontal line is the height of the eye; ships and boats of various descriptions are seen; but even the sails of most of them appear below the horizon, and the sky forms but a small part of the picture. In fig. 4, the horizon is still even with the eye; but it will be seen that this view is more pleasing than the former one, as the space between the horizon and the base

line occupies a smaller part of the picture. This example, therefore, is much more worthy of imitation. The same observations apply to an inland horizon; the only reason for selecting marine subjects for these examples, is, that the plane or surface of the sea is more regular than that of a landscape, and the horizon consequently unobscured by objects rising above it.

The *point of sight* is the point or spot directly opposite to the eye, when looking at any object; and as the horizontal line is always even with the eye, of course the point of sight is in the horizontal line. In fig. 5 a number of upright poles are seen to the left hand; they are all standing on the same plane, and at an equal distance from each other. Common observation will convince you that the farther any object is from the eye, the smaller it appears, and thus the poles in the drawing gradually lessen as they recede from the view. The reason is, that all the lines in the picture terminate in the point of sight, and therefore lines drawn from the top and bottom of the first pole to the point of sight in the horizon, will give the true height in perspective of the whole of them. All lines below the horizon, terminating in the point of sight, must incline upwards, and those above the horizon downwards. The reason why all objects appear smaller as they recede from the eye, is, because all objects appear large or small according to the angle at which they are seen. This may be understood by looking at fig. 5; here the line formed by the rays from the top and bottom of the poles meet in the eye, and would, if carried out, form certain angles, appearing smaller the nearer they approach it. In fig. 6 is a cottage with a church on a hill; they are introduced in order to show that the lines of both terminate in the same point of sight.

Having briefly described the horizontal line and the point of sight, we now proceed to the *point of distance*. This point is the place where the spectator stands to take the view, and of course can never be seen in the picture. You must recollect that the eye cannot conveniently take in more rays than are included in a right angle; and for this reason, that the pupil being in the centre of the eye, does not well admit more than a quadrant of a circle, so that whatever rays exceed that portion, if seen at all, only produce a dim confused effect. All that comes within the lines formed by the quadrant may be seen distinctly, but if you wished to take in a greater extent of country you could not do it from the same point of distance without turning the head, and thus having another point of sight, which would throw your whole drawing into confusion; but if you were to stand at a greater distance, the angle would be larger, and would take in more of the view; and the

point would in this case be a greater distance from the point of sight.

In fig. 6, *d* is the base line, and we shall try to put a square in perspective, one side of which, *cc*, is measured on the base line. To effect this, we draw lines from *cc* to the point of sight *a*; and to determine how large the square would appear in perspective from *cc*, dotted lines are made to *b b*, the points of distance; the points where they intersect the lines drawn to the point of sight, will give the true size of the other three sides of the square.

Accidental points are so called, because they are not drawn to the point of sight, or to the point of distance, but appear accidentally on the horizon, according to the situation of the object.

Fig. 7 shows the side or oblique view of the same object. In this position, it presents two sides to the view; and the point of sight *a*, instead of appearing in the middle of the horizon, as was the case in the front view, must be placed nearer the side of the picture. The real point of sight, you must recollect, is still in the centre of the horizontal line, but the position of the eye being greatly on one side of the object, the horizon is so much extended, that the whole of it cannot be given on the paper, and for the same reason, only one point of distance, *b*, can be introduced. This figure is not lettered, because the process of putting this square in perspective is the same as in the preceding example.

Fig 8 shows a room in perspective, with the lines running on all sides to one point, which is the point of sight.

In order to aid the artist in giving the different objects their proper size and situations, it is well to form, as soon as possible, the height of the horizontal line, and to adapt the height of any object either above or below it, according to the distance required from it, compared with its own breadth, or that of any other object which may have been already marked out. Having in this manner marked the places of the different objects, he may proceed to sketch their forms, making sure of the larger objects before he proceeds to the smaller ones. Particular attention should be paid by the landscape painter to the study of architecture, as the style of his buildings will greatly enrich his pictures. The style of his trees is of still greater importance; the beauty and variety of their foliage afford the artist an opportunity of displaying his taste and correctness, and at the same time of adding greatly to the interest and expression of the piece.

## SHADING.

In shading with black lead or chalk, no particular rule can be given for arranging the lines; this must be learned by copying

from good drawings, and carefully marking the practice of the best masters. Yet it may be remarked in general, that, if an object be perpendicular, the lines should be so too, only crossing them occasionally for the sake of variety and richness. In any round object, such as a tower, the lines should be curved in proportion to its size; and if an object be inclined, the lines should be made to follow that inclination. In shading a sky or hills, where a broad, smooth tint is required, the shades may be done by the motion of the whole hand and wrist; but in buildings and other objects where exactness is required, no more should be attempted than can be done by the movement of the fingers and thumb with the wrist fixed steadily on the paper.

Sepia is now much more used than Indian-ink, as it makes much more pleasing drawings, and produces a warmer tint. The methods of using these colours are nearly the same. The following general instructions for shading with Indian ink any simple sketch of landscape scenery will be found useful. The paper being properly strained on a board, and having provided yourself with a cake of Indian ink, and a set of brushes or camel-hair pencils, of different sizes, a white plate and a cup of cold soft water, commence by damping your paper with the largest brush full of water; then dip one of your brushes in water, and let a few drops fall from it upon one side of the plate, on which rub up your Indian ink, taking care not to leave it too wet. Having so done, take a large brush, and dip it into the Indian ink, and on another part of the plate mix it with water till it becomes sufficiently pale to form the first tint. Then with the same brush, beginning at the left hand corner at the top of the drawing, put the whole in this shade, with the exception of any strong light which it may be needful to retain. You will at first find it difficult to form a broad flat tint, as you will be fearful of using too much colour; but you must always keep the brush full, even if you are merely at the end of the space you wish to cover, otherwise the edge of the tint will dry before you get more in your brush, and the sky will be spoiled with lines running across it. Having laid on the first tint, mix the second tint on the plate a little darker; with this tint form the trees, the windows and doors of buildings, and in fact, every part that requires a second shade. When this is quite dry, put in a stronger shadow with the third tint. You have now the whole of the drawing in light, shade, and middle tints, and you may finish with a fourth tint much darker, working with rather a smaller brush, with which you may form the broken parts of thatch, &c, the dark parts of trees, rushes, &c.

As the shading with sepia produces a more clear and transparent

effeet than Indian ink, the following instructions are given, which will enable the learner to shade a marine view, or any other drawing of a similar kind, with that colour.

After you have drawn the outline of the subject, and sketched lightly the form of the large elouds that float on the horizon, proceed as before to form the first tint. With the large brush begin at the top and go over all that part of the sky that requires a flat tint; then take another brush with a little water only, and wash the edges towards the rolling clouds, till it leaves no colour on the paper; this is called softening, and will prevent the hard wiry appearanee which your early attempt at skies will undoubtedly have, unless treated in this way. You will next mix a tint a shade darker than the first; and with this form the elouds, softening them off towards the edge of that part of the sky formed before; this will leave the strong light at the edges, but with a soft and aerial effect, as though the clouds melted into each other; while the sky is drying you can go over the water, with the first and second tints, without touehing the sails of the vessels, as the colour would run into and injure the sky. When the tints previously laid on are dry, take a smaller brush, and form the masts of the large vessels; put the boats and shipping at a distance in the first and seeond shade. You may now make a transparent cloud over the flat tints first applied, and the sky is finished: the hulk of the larger vessels, the masts, rigging, &e. with boats, or other objeets in the foreground, must be finished up with darker colour, and the last touehes, to give effeet, as dark as they can be made.

## COLOURING.

Before the learner commences eoloured drawings, it is neeessary to observe that yellow, blue, and red, are the three primitive colours; and if these could be obtained in perfection, we should be enabled, by combining them, to form every tint that is required. From the three primitive or simple colours are formed four compounds: first, blue and yellow, which produces green; seeondly, yellow and red, which forms orange; thirdly, red and blue, which forms purple; fourthly, the mixture of the three primitive colours forms a grey. It will be obvious, from this short explanation of the theory of colours, that by the mixture of the tints formed by the different compounds, an endless variety of shades may be produced. This aceounts for the great number of different colours which may be purchased, many of which are ealled after the names of the artist who invented them, and are eagerly sought after by persons who are endeavouring to produce brilliant drawings without a previous knowledge of light and shade. All persons who eommence

colouring may be assured, that a judicious selection of a few colours will aid them more than the possession of all the fanciful tints with which expensive boxes of colours are loaded.

A box which contains the twelve following colours, will produce every tint required in the most finished drawing.

| | | |
|---|---|---|
| 1. Yellow Ochre. | 5. Vermilion. | 9. Sepia. |
| 2. Gamboge. | 6. Lake. | 10. Vandyke Brown. |
| 3. Italian Pink. | 7. Venetian Red. | 11. Indigo. |
| 4. Raw Umber. | 8. Burnt Sienna. | 12. Prussian Blue. |

To these colours may be added a few colours which will sometimes be found useful, and with the names and qualities of which it is proper that you should be acquainted. Ultramarine is the finest and most beautiful blue that can be produced, and is a preparation of calcined lapis lazuli. This colour is too expensive to be introduced into a box of colours for a learner, as a very small cake amounts to a guinea; nor is this much to be regretted, as it is very difficult to use, and is not easily levigated on the palette. It is chiefly used by miniature and enamel painters, and is to them a most invaluable colour, as it will stand well, retaining its brilliancy for centuries. Carmine is a very bright rose-colour, more brilliant than lake: this colour is expensive, and is chiefly used in fruit and flower pieces. Gallstone is a bright yellow, but very little superior to gamboge, and more expensive. The great disadvantage of this colour is its liability to fade; it is very transparent, and is sometimes used to lay over greens, which having too cold a tone of colour require warmth. King's yellow is a useful opaque colour; it is a pure orpiment, or arsenic coloured with sulphur, and must therefore be used with care by those who put their brush in their mouths. Indian red is nearly the colour of Venetian red; but not so generally useful, as its weight causes it to sink in water, and renders the tints formed with it muddy.

The above colours may be combined in various ways, so as to produce all the varieties needful. The perfect use of them can only be acquired by great practice, and in the use of the best possible copies.

## Section II.—Painting in Glass.

The ancient painting in glass was very simple: it consisted in the mere arrangement of pieces of glass of different colours in some sort of symmetry, and constituted what is now called Mosaic work. In process of time they came to attempt more regular designs, and also to represent figures heightened with all

their shades: yet they procceded no farther than the contours of the figures in black with water-colours, and etching the draperies after the same manner on glasses of the colour of the object they designed to paint. For the carnation they used glass of a bright red colour; and upon this they drew the principal lineaments of the face, &c. with black. At length, the taste for this sort of painting improving considerably, and the art being found applicable to the adorning of churches, palaces, &c., they found out means of incorporating the colours in the glass itself, by heating them in a fire to a proper degree, having first laid on the colours.

A French painter at Marseilles is said to have given the first notion of this improvement, upon going to Rome, under the pontificate of Julius II.; but Albert Durer, and Lucas of Leyden, were the first that carried it to any height.

The colours used in painting or staining of glass are very different from those used in painting either in water or oil colours. For black, take scales of iron, one ounce; scales of copper, one ounce; jet, half an ounce; reduce them to powder, and mix them. For blue, take powder of blue, one pound; nitre, half a pound; mix them, and grind them well together. For carnation, take red chalk, eight ounces; iron scales, and litharge of silver, of each two ounces; gum-arabic, half an ounce; dissolve in water, grind altogether for half an hour as stiff as you can; then put it in a glass and stir it well, and let it stand to settle fourteen days. For green, take red lead, one pound; scales of copper, one pound; and flint, five pounds; divide them into three parts, and add to them as much nitre; put them into a crucible, and melt them with a strong fire, and when it is cold, powder it, and grind it on a porphyry. For gold colour, take silver an ounce; antimony, half an ounce: melt them in a crucible, then pound the mass to powder, and grind it on a copper plate; add to it yellow ochre, or brick dust calcined again, fifteen ounces; and grind them well together with water. For purple, take minium, one pound; brown stone, one pound; white flint, five pounds; divide them into three parts, and add to them as much nitre as one of the parts; calcine, melt, and grind it as you did the green. For red, take jet, four ounces; litharge of silver, two ounces; red chalk, one ounce; powder them fine, and mix them. For white, take jet, two parts; white flint, ground on a glass very fine, one part; mix them. For yellow, take Spanish brown, ten parts; leaf silver, one part; antimony, half a part; put all into a crucible, and calcine them well.

In all the windows of ancient churches, &c., there are to be seen the most beautiful and vivid colours imaginable, which far

exceed any of those used by the moderns, not so much because the secret of making those colours is entirely lost, as that the moderns will not go to the charge of them, nor be at the necessary pains, by reason that this sort of painting is not now so much in esteem as formerly. Those beautiful works, which were made in the glass houses, were of two kinds.

In some, the colour was diffused through the whole substance of the glass. In others, which were far the most common, the colour was only on one side, scarce penetrating within the substance above one-third of a line; though this was more or less according to the nature of the colour, the yellow being always found to enter the deepest. These last, though not so strong and beautiful as the former, were of more advantage to the workmen, by reason that on the same glass, though already coloured, they could show other kinds of colours where there was occasion to embroider draperies, enrich them with foliage, or represent other ornaments of gold, silver, &c.

In order to this, they made use of emery, grinding or wearing down the surface of the glass till such time as they were got through the colour to the clear glass. This done, they applied the proper colours on the other side of the glass. By these means, the new colours were hindered from running and mixing with the former, when they exposed the glasses to the fire, as will appear hereafter. When, indeed, the ornaments were to appear white, the glass was only bared of its colour with emery, without tinging the place with any colour at all; and this was the manner by which they wrought their lights and heightenings on all kinds of colour.

The first thing to be done in order to paint or stain glass in the modern way, is to design, and even colour the whole subject on paper. Then they choose such pieces of glass as are clear, even, and smooth, and proper to receive the several parts; and proceed to distribute the design itself, or the paper it is drawn on, into pieces suitable to those of the glass, always taking care that the glasses may join in the contours of the figures, and the folds of the draperies; that the carnations and other finer parts may not be impaired by the lead with which the pieces are to be joined together. The distribution being made, they mark all the glasses as well as papers, that they may be known again; which done, applying every part of the design upon the glass intended for it, they copy or transfer the design upon this glass with the black colour diluted in gum-water, by tracing and following all the lines and strokes which appear through the glass with the point of a pencil.

As to the other colours above mentioned, they are used with gum-water, much as in painting in miniature; taking care to apply them lightly, for fear of effacing the outlines of the design; or even for the greater security, to apply them on the other side; especially yellow, which is very pernicious to the other colours, by blending therewith. And here too, as in pieces of black and white, particular regard must always be had not to lay colour on colour, or put on a new lay, till such time as the former is well dried.

When the painting of the pieces is finished, they are carried to the furnace to anneal or bake the colours.

Having often been delighted with the grand effect produced by the windows of stained glass in old churches and monasteries, we have regretted that such fine and durable colouring should, in so many cases, have been prostituted upon wretched designs, inferior to the productions of our sign-post daubers. We have wished that some mode could be devised of copying and multiplying pictures upon glass—some mechanical mode, which should require the aid of the artist in the first instance only, and leave all the subsequent operations to be performed by inferior hands, as in the case of copper-plate printing. Portraits, at least, on a single piece of glass, which should perpetuate the features of great men and beautiful women, secure from that decay of colour and of canvas which has already begun to obliterate the finest paintings of the greatest artists whom the world has ever produced, might possibly be produced in the following way.

Suppose, after the outline of a likeness is drawn, that blocks were cut from it after the same manner as for calicoes or paper-hangings, only with superior nicety, and in greater number for the purpose of multiplying and better blending the tints.

Enamellers must determine what shall be the proper substances for the different colours, and with what liquid they shall be moistened, that they may be readily taken up by the blocks, and thence transferred to another body by pressure.

From these blocks, and with these colours, let the figure be printed on paper; and, to prevent inaccuracy in bringing the separate parts, cut on the different blocks, to unite into a complete whole, let the paper be placed under the frame, secured in an immovable position during the operation. The blocks being accurately squared, all exactly of the same dimensions, and each nicely fitting the frame, cannot, in passing through it to deliver their several impressions, make the smallest deviation from their intended places, but must produce an exact picture—at least on the paper.

To transfer that impression to glass, is indeed a work of nicety and difficulty. Were it not for some smaller strokes which must necessarily be in wood, the entire impression might be made on the glass itself, without any intervention of paper, since experience has proved to the calico-printer, that the great masses of colour cannot be successfully delivered from wood; therefore they are obliged, in those parts of their patterns, to use bits of smooth worn-out beaver hat, which might very well be pressed on the glass-plate.

However, from what we every day see effected in the case of prints affixed to glass without any of the paper remaining, and also of copper-plate embellishments upon porcelain and queen's ware, we doubt not that the picture while fresh, may, by well managed pressure, be transferred from the paper to an even plate of ground glass, coated with a proper gluten, which shall not, at least not materially, offuscate its transparency; and experiment must determine whether the paper may afterward be gently drawn or peeled off, or must be burned away, or destroyed by a corrosive liquid, if any such can be found which will not injure the colours.

Suppose, however, the operation of removing the paper to be satisfactorily performed, proceed we now to secure the ndelibility of the picture.

Let a square plate of cast-iron, an inch or two in thickness, and as level and smooth as possible, be furnished on every side with a metal ledge rising an inch or more in height, which ought to be in two separate pieces, the one permanently fastened to the plate, the other capable of being removed at pleasure, for the purpose of laying in and taking out the glass without violence.

Within that ledge let the glass be fitted, closely touching it on every side, and lying with the painted surface uppermost. Upon this lay another plate of glass, fitted in the same manner.

Let, now, the metal frame, with the enclosed glasses, be exposed to the action of fire until the glass plates, without being melted to absolute fluidity, shall nevertheless become sufficiently soft to coalesce into one body under a strong pressure. The body which conveys the pressure, and lies in immediate contact with the glass, must equally fit and completely fill the entire space between the ledges, that there be no room for the soft glass to spread in any direction.

Those who have witnessed the process pursued in softening tortoise-shell in the fire, and pressing it into the various shapes of snuff boxes, etuis, &c. &c., will not conceive much difficulty in this use of the glass. It may be managed by the aid of a machine somewhat similar to, but more powerful than, a common printing

press, with a solid metal platine, to fit and fill the frame, as above; though much better contrivances may be found among the multifarious engines employed at Birmingham for the purposes of coining, and striking the heavy dies, than any we can possibly suggest. In whatever manner the two glasses may be pressed into union, the united body may be afterward ground and polished.

## ENAMELLING.

The delicate and beautiful art of enamelling, consists in the application of a smooth coating of vitrified matter, (transparent or opaque, and with or without colour, figures, and other ornaments,) to a bright polished metallic substance. It is, therefore, a kind of varnish made of glass, and melted upon the substance to which it is applied, and affording a fine uniform ground for an infinite variety of ornaments, which are also fixed on by heat.

The general principles on which enamelling is founded, are on the whole very simple; but, perhaps, there is none of all the chemico-mechanical arts which requires, for the finer parts, a greater degree of practical skill and dexterity, and of patient and accurate attention to minute processes.

The concealment observed by those who profess this art, is proportioned to the difficulty of acquiring it; the general chemist must, therefore, content himself with the general principles of enamelling, and the detail of those particulars that are commonly known.

Though the term enamelling is usually confined to the ornamental glazing of metallic surfaces, it strictly applies to the glazing of pottery or porcelain, the difference being only that in the latter the surface is of baked clay. With regard to the composition of coloured enamels (which are all tinged by different metallic oxydes), a very general account of the substances used will suffice in this place, the rest of the subject having been treated of in the preceding section. The enamelling on metals, will only be noticed in this place. The only metals that are enamelled, are gold and copper; and with the latter the opaque enamels are only used. Where the enamel is transparent and coloured, the metal chosen should be of that kind, as not only to have its surface unalterable when fully red-hot, but also to be in no degree chemically altered by the close contact of melted glass containing an abundance of some kind of metallic oxyde. This is the chief reason why coloured enamelling on silver is impracticable, though the brilliance of its surface is not impaired by mere heat; for if (for example) an enamel made yellow with oxyde of lead, or

antimony, is laid on the surface of bright silver, and kept melted on it for a certain time, the silver and the enamel act on each other so powerfully, that the colour soon changes from a yellow to an orange, and lastly to a dirty olive. Copper is equally altered by the coloured enamels, so that gold is the only metal which can bear the long contact of the coloured glasses at full red heat without being altered by them.

The simplest kind of enamel is that fine white opaque glass, which is applied to the dial plate of watches. The process of laying it on (which may serve as a general example of the art) is the following.

A piece of thin copper sheet, hammered of the requisite convexity, is first accurately cut out, a hole drilled in the middle for the axis of the hands, and both the surfaces made perfectly bright, with a scratch brush.

A small rim is then made round the circumference, with a thin brass band rising a little above the level, and a similar rim round the margin of the central hole. The use of these is to confine the enamel when in fusion, and keep the edges of the plate quite neat and even. The substance of the enamel is a fine white opaque glass, the material of which will be presently mentioned. This is bought in lump by the enamellers, and is first broken down with the hammer, then ground to a sufficiently fine powder, with some water, in an agate mortar; the superfluous water being then poured off, the pulverized enamel remains of about the consistence of wetted sand, and is spread very evenly over the surface of the copper plate by many dexterous manipulations. On most enamellings, and especially on this, it is necessary also to counter-enamel the under concave surface of the copper plate, to prevent its being drawn out of its true shape, by the unequal shrinking of the metal and enamel on cooling. For this kind of work, the counter-enamel is only about half the thickness on the concave as on the convex side. For flat plates, the thickness is the same on both sides.

The plate, covered with the moist enamel powder, is warmed and thoroughly dried, then gently set upon a thin earthen ring, that supports it only by touching the outer rim, and put gradually into the red hot muffle of the enameller's furnace. This furnace is constructed somewhat like the assay furnace; but the upper part alone of the muffle is much heated, and some peculiarities are observed in the construction, to enable the artist to govern the fire more accurately.

The precise degree of fire to be given here as in all enamelling, is that at which the particles of the enamel run together into an

uniform pasty consistence, and extend themselves evenly over the surface, showing a fine polished face, carefully avoiding on the other hand so great a heat as would endanger the melting of the thin metallic plate. When the enamel is thus seen to sweat down, as it were, to an uniform glossy glazing, the piece is gradually withdrawn and cooled, otherwise it would fly by the action of the cold air.

A second coating of enamel is then laid on and fired as before, but this time the finest powder of enamel is taken, or that which remains suspended in the washings. It is then ready to receive the figures and division marks, which are made of a black enamel, ground in an agate mortar, with much labour, to a most impalpable powder, worked up on a pallet with oil of lavender, or spike, and laid on with an extremely fine hair brush. The plate is then stoved to evaporate the essential oil, and the figure burnt in as before. The polishing with tripoli, and minuter parts of the process, need not be here mentioned.

If the enamel be chipped off a dial plate, (which may be done with the utmost ease, by bending it backwards and forwards, as the adhesion between the metal and glazing is very slight) the part immediately in contact with the copper will be found deeply and nearly uniformly browned, which shows how unfit copper alone would be for the transparent enamels.

The regulation of the fire appears to be the most difficult of all the parts of this nice process, particularly in the fine enamelling of gold for ornamental purposes, of designs, miniatures, and the like; where three, four, or sometimes five separate firings are required. If the heat is too low, the enamel does not spread and vitrify as it ought; if too high, it may be enough to melt the metal itself, whose fusing point is but a small step above that of the enamel, or else (what is an equal mortification to the artist) the delicate figures, laid on with so much care and judgment, melt down in a moment, and the piece exhibits only a confused assemblage of lines, and fragments of designs.

The exact composition of the opaque white enamel, is a matter of considerable importance, and is procured by the enamellers from persons whose business it is to prepare it. A good enamel of this kind, fit to be applied to porcelain and metals, should be of a very clear fine white, so nearly opaque, as only to be translucent at the edges; and at a moderate red heat it should run into that kind of paste, or imperfect fusion, which allows it to extend itself freely and uniformly, and to acquire a glossy even surface, without, however, fully melting into a thin glass. The opaque white of this enamel is given by the oxyde of tin, which

posseses, even in a small proportion, the property of rendering vitrescent mixtures white and opaque, or in still less proportion, milky; and when otherwise coloured, opalescent. The oxyde of tin is always mixed with three or four times its quantity of oxyde of lead; and it appears necessary that the metals should be previously mixed by melting, and the alloy then calcined. The following are the directions by Clouet for the composition of this enamel. Mix 100 parts of pure lead with 20 to 25 of the best tin, and bring them to a low red heat in an open vessel. The mixture then burns nearly as rapidly as charcoal, and oxidates very fast. Skim off the crusts of oxyde, successively formed, till the whole is thoroughly calcined. It is better then to mix all the skimmings, and again heat as before, till no flame arises from them, and the whole is of an uniform grey colour. Take 100 parts of this oxyde, 100 of sand, and 25 or 30 of common salt, and melt the whole in a moderate heat. This gives a greyish mass, often porous and apparently imperfect, but which, however, runs to a good enamel when afterwards heated. This is the enamel used for porcelain, but for metals and finer works the sand is previously calcined in a very strong heat with a fourth of its weight, or if a more fusible compound is wanted, as much of the oxyde of tin and lead as of salt is taken, and the whole melted to a white porous mass. This is then employed instead of the rough sand, as in the above-mentioned process. The above proportions, however, are not invariable, for if more fusibility is wanted, the dose of oxyde is increased, and that of the sand diminished, the quantity of common salt remaining the same. The sand employed in this process, according to Mr. Clouet, is not the common sort, however fine, but a micaceous sand, in which mica forms about one-fourth of the mixture.

Neri, in his valuable treatise on glass-making, has given long ago the following proportions for the common material of all the opaque enamels, which Kunckel and other practical chemists have confirmed. Calcine 30 parts of lead, with 33 of tin, with the precautions mentioned above. Take of this calcined mixed oxyde 50 pounds, and as much of powdered flints (prepared by being thrown into water when red hot, and then ground to powder), and eight ounces of salt of tartar; melt the mixture in a strong fire kept up for ten hours, after which reduce the mass to powder. This is the common material for the opaque enamels, and is of a grey white. To make this fine enamel quite white, mix six pounds of this material with 48 grains of the best black oxyde of manganese, and melt in a clear fire. When fully fused, throw it into cold water, then re-melt and cool as before two or three

times, till the enamel is quite white and fine. Kunckel observes on this process, that he tried it without the oxyde of manganese, but the enamel, instead of being milk-white, was bluish, and not good, so that there is no doubt but that this oxyde is highly important. If too much is used, the enamel becomes of a rose purple.

Coloured enamels are composed of a common basis, which is a fusible mixture of vitrified materials, and of some metallic oxyde. In general, the coloured enamels are required to be transparent, in which case, the basis is a kind of glass, composed of borax, sand, and oxyde of lead, or other vitrescent mixtures, in which the proportion of saline or metallic flux is more or less according to the degree of heat that the colouring oxyde will bear without decomposition. When the coloured enamel is to be opaque, or opalescent, a certain portion of the white opaque enamel, or of the oxyde of tin, is added to the mixture. The most beautiful and costly colour known in enamelling, is an exquisitely fine rich red, with a purplish tinge, given by the salts and oxydes of gold, expecially the purple precipitate, formed by tin in one form or other, and nitro-muriate of gold, and also by the fulminating gold. This beautiful colour requires much skill in the artist to be fully brought out. It is said, that when most perfect, it should come from the fire quite colourless, and afterwards receive its colour by the flame of a candle. Gold colours will not bear a violent fire.

Other and common reds are given by the oxyde of iron, but this requires the mixture of alumine, or some other substance refractory in the fire, otherwise at a full red heat the colour will degenerate into black.

Yellow is given either by the oxyde of silver alone, or by the oxydes of lead and antimony, with similar mixtures to those required for iron. The silver is as tender a colour as gold, and readily injured or lost in a high heat.

Green is given by the oxyde of copper, or it may also be procured by a mixture of blue and yellow colours.

Blue is given by cobalt; and this seems of all enamel colours the most certain, and easily manageable.

Black is produced by a mixture of cobalt and manganese.

The reader may conceive how much the difficulties of this nice art are increased, when the object is not merely to lay uniform coloured glazing on a metallic surface, but also to paint that surface with figures and other designs, that require extreme delicacy of outline, accuracy of shading, and selection of colouring. The enamel painter has to work, not with actual colours, but with

mixtures, which he only knows from experience will produce certain colours after the delicate operation of the fire ; and to the common skill of the painter, in the arrangement of his palette and choice of his colours, the enameller has to add an infinite quantity of practical knowledge of the chemical operation of one metallic oxyde on another, the fusibility of his materials, and the utmost degree of heat at which they will retain not only the accuracy of the figures which he has given, but the precise shade of colour which he intends to lay on.

Painting in enamel requires a succession of firings ; first of the ground which is to receive the design, and which itself requires two firings, and then of the different parts of the design itself. The ground is laid on in the same general way as the common watch face enamelling already described. The colours are the different metallic oxydes, melted with some vitrescent mixture, and ground to extreme fineness. These are worked up with an essential oil (that of spike is preferred, and next to it oil of lavender) to the proper consistence of oil colours, and are laid on with a very fine hair brush. The essential oil should be very pure, and the use of this, rather than any fixed oil, is probably that the whole may evaporate completely in a moderate heat, and leave no carbonaceous matter in contact with the colour when red hot, which might affect its degree of oxydation, and thence the shade of colour which it is intended to produce. As the colour of some vitrified metallic oxydes (such as that of gold) will stand only at a very moderate heat, while others will bear, and even require, a higher temperature to be properly fixed, it forms a great part of the technical skill of the artist to supply the different colours in proper order ; fixing first those shades which are produced by the colours that will endure the highest heat, and finishing with those that demand the least. The outline of the design is first traced on the ground enamel, and burnt in ; after which, the parts are filled up gradually with repeated burnings, to the last and finest touches of the tenderest enamel.

Transparent enamels are scarcely ever laid upon any other metal than gold, on account of the discoloration produced by other metals, as already explained. If, however, copper is the metal used, it is first covered with a thin enamel coating, over which gold leaf is laid and burnt in, so that, in fact, it is still this metal that is the basis of the ornamental enamel. With regard to the vast number of important minutiæ in the selection and order of applying the colours, the management of the fire, &c. &c. almost the whole of what is known on this subject is confined to the practical artist ; nor could this knowledge, if obtained, interest the general reader.

## Section IV.—Engraving.

This curious and valuable art is for the most part of modern invention, having its rise no earlier than the middle of the fifteenth century. The ancients, indeed, practised engraving on precious stones and crystals with very good success; and there are still many of their works remaining equal to any production of the latter ages. But the art of engraving on plates and blocks of wood, to afford prints or impressions, was not known till after the invention of painting in oil. Of these last, the most ancient mode is that on wood, the first impressions on paper having been taken from carved wooden blocks. For this invention we are indebted to the *brief-malers*, or makers of playing-cards, who practised the art in Germany about the beginning of the fifteenth century. From the same source may perhaps be traced the first idea of movable types, which appeared not long after; for these brief-malers did not entirely confine themselves to the printing and painting of cards, but produced also subjects of a more devout nature; many of which, taken from holy writ, are still preserved in German libraries, with the explanatory text facing the figures; the whole engraved in wood. Thus a species of books was formed; such as, Historia Sancti Johannis, ejusque Visiones Apocalypticæ; Historia Veteris et Novi Testamenti, known by the name of the Poor Man's Bible. These short mementos were printed only on one side; and two of them being pasted together, had the appearance of a single leaf. The earliest date on any of these wooden cuts is 1423.

Upon the invention of movable types, that branch of the brief-maler's business, so far as it regarded making of books, was gradually discontinued; but the art itself of engraving on wood continued in an improving state, and towards the end of the fifteenth century, and the beginning of the sixteenth century, it became customary for almost every one of the German engravers on copper to engrave on wood also. The works of Albert Durer in this style of engraving are justly held in the highest esteem. Italy, France, and Holland, have produced many capital artists of this kind; but for boldness and spirit we must see the prints of Christopher Jegher, who worked under the direction of Rubens, and was without doubt assisted by that great master. The invention of that species of engraving distinguished by the appellation of chiaro-scuro, seems also to be justly claimed by the Germans, and first practised by Mair; one of whose prints of this kind is dated 1499. In Germany, about A.D. 1450, prints from engraved copper first made their appearance. The earliest date of a copper-plate print is 1461.

With respect to the invention of etching, it seems to be not well known to whom it is to be ascribed. One of the most early specimens is the print of Albert Durer, known by the name of the Cannon, dated 1518, and thought by some, with little foundation, to have been worked on a plate of iron. Another etching, by the same artist, is Moses receiving the tables of the law, dated 1524. It was also practised in Italy soon after this, by Parmegiano, in whose etchings we discover the hand of the artist working out a system, as it were, from his own imagination, and striving to produce the forms he wanted to express. As to that species of engraving in which the modes of etching and cutting with the graver are united, it must have been found necessary immediately upon the invention of etching; it was, however, first carried to perfection by G. Audran, and is now almost universally practised, whether the work is in strokes or in dots. Engraving in dots is a very old invention, and the only mode discovered by the Italians. Agostino de Musis, commonly called Augustine of Venice, a pupil of Marc Antonio, used it in several of his earliest works, but confined it to the flesh, as in the undated print of an old man seated upon a bank, with a cottage in the back-ground. He flourished from 1500 to 1536.

Engraving in mezzotinto was invented about the middle of the seventeenth century; and the invention has generally been attributed to prince Rupert. Engraving in aquatinta is quite a recent invention, and seems at once to have been carried to perfection by Sandby, and other artists of the present age. Engraving with the tool was the kind originally practised, and it is yet retained for many purposes. For though etching is more easy, and other advantages attend it; yet where great regularity and exactness of the strokes or lines are required, the working with the graver is much more effectual; on which account it is more suitable to the precision necessary in the execution of portraits. Historical engravings for the port-folio and furniture, seemed at one period to advance rapidly towards perfection, to which the late alderman Boydell largely contributed; but the death of Strange, Hall, and Woollet, have been almost fatal to the hopes of the amateur, which rest, in a great measure, upon Heath, Sharp, Bromley, and a few others, as in this particular instance we do not include those eminent foreigners who have resided, or do at present reside in England.

Till within the last few years, all works of art were engraved on plates of copper, but latterly steel has been substituted, with great effect, for all subjects which require a great number of impressions. In engraving on steel, the same process is to be

followed as on copper, but instead of aquafortis, other chemical substances are employed in the biting in. Some of the finest and most delicate subjects engraven on steel will produce 10,000 impressions, while the same on copper will not exceed 1500 or 2000.

*Lithography.*—A very ingenious process has of late years been employed on the continent, to answer at the same time both the purposes of designing and engraving; or, in other words, to produce an engraving by the art of designing. This art, or process, is called Lithography, or stone-engraving; and among the German artists, who have recourse to it, Chemische Druckery, or chemical printing. It was first discovered, in A.D. 1800, by Aloys Senefelder, one of the performers in the theatre-royal at Munich, in Bavaria.

M. Senefelder, soon after this discovery, obtained the exclusive privilege of carrying it on in the dominions of the elector of Bavaria for thirteen years. In 1803, he introduced his discovery into Vienna, where he obtained a similar grant for ten years. The invention spread, though slowly, into France and Italy; but was not brought over to England till some time after, when M. André D'Offenbach, a merchant in London, succeeded in obtaining several beautiful drawings on stone by the first artists, which were afterwards published in numbers, containing six impressions, at half-a-guinea each. The invention has, during the last few years, received considerable patronage in England, particularly through the attention bestowed on it by Mr. Ackermann, and has proved a valuable addition to the various modes of engraving. It differs, in its fundamental principles, from all other methods previously in use, and therefore has been called chemical printing. All the other methods of printing, hitherto known, might be divided into two branches; the one multiplying the original by elevated forms, the other by engraved forms. To the first branch belong the common letter-press printing, that of wooden blocks, etc.; under the second may be included all the methods of engraving on copper, tin, etc. But the lithographic art differs from both these, and depends entirely on the following chemical principles:—1. The facility with which water is imbibed by calcareous stones; 2. The strong adhesion which exists between resinous or oily substances and calcareous stones; 3. The affinity which resinous or oily substances have for each other, and the quality which they possess of repelling water, or any body moistened with water.

All calcareous stones, that are susceptible of a fine polish, and capable of being penetrated by an oily substance, and of imbibing

water with facility, are applicable to this art. The more compact they are, however, the more valuable; and it is necessary also that they be of a uniform colour. The quarries of Germany abound with stones of this description; they were chiefly a sort of calcareous slate, found in the country from Dietfort to Pappenheim, and along the banks of the Danube, down to Kelheim. The stones were indeed thought to be peculiar to Germany; but it has been discovered, that a similar stone is to be found in great abundance in the neighbourhood of Bath, and some parts of Scotland, and they are now in common use.

The chemical ink is used for writing or drawing immediately on the stone, or for covering the surface of it, like etching ground, or for transferring drawings, executed on paper, to the stone. The following composition was recommended by M. Senefelder:

| | | | |
|---|---|---|---|
| White beeswax . . . . | by weight | 8 | parts. |
| Soap . . . . . | ,, | 2 | ,, |
| Lampblack . . . . . | ,, | 1 | ,, |

But this has been subsequently much varied and improved, and the art has been brought to such perfection as to rival some of the finest efforts of the graving tool. Very recently also plates of zinc have been substituted with considerable success for stone, and beautiful drawings have been produced from them.

A great variety of works on drawing are now published by Ackermann and others, but they are too well known to need being mentioned.

## Section V.—Sculpture.

Engraving is occasionally called working *en creux*, sculpture working in relievo: yet, in its comprehensive range, the word sculpture has been applied to both these.

The studies necessary for the young sculptor, towards the attainment of his art, are so similar to those which form the painter (with the obvious exceptions arising from the difference of materials employed in the two arts), that very little remains here to be enlarged on, under the head of studies. The principal acquisitions to which the student must direct his endeavours are, a knowledge of composition, form (including anatomy), and expression; to which, as in painting, must be added the difficult study of grace.

The method of study most recommended to young sculptors is, to begin with copying, and to end with rivalling, the forms of the Greek statues.

The method of execution in the Greek statues and other works of sculpture seems to have been extremely different from that which is generally in use among modern artists. In the ancient statues, we frequently find striking proofs of the freedom and boldness that accompanied each stroke of the chisel, and which resulted from the artist's being perfectly sure of the accuracy of the method which he pursued. Even in the most minute parts of the figure, no indication of timorousness or diffidence appears: nothing that can induce us to believe that the artist feared he might have occasion to correct his strokes. It is difficult to find, even in the second-rate productions of Grecian artists, any marks of a false or a random touch. This firmness and precision of the Grecian chisel were certainly derived from a more determined and perfect set of rules than those of which we are masters.

Besides studying, therefore, in the productions of the Grecian masters, their choice and expression of select nature, whether beautiful, sublime, or graceful, together with that sedate grandeur and simplicity which pervade all their works, the artist will do well to investigate the manual and mechanical part of their operations, as they may lead to the perception of their mode of progress.

As soon as the artist has rendered himself familiarly acquainted with the beauties of the Grecian statues, and formed his tastes on the admirable models they exhibit, he may then proceed with advantage and assurance to the imitation of nature. By observing her dispersed beauties combined and collected in the composition of the ancient artists, he will be enabled to acquire with facility, and to employ with advantage, the detached and partial ideas of beauty which will be exhibited to his view in a survey of nature in her actual state. When he discovers these partial beauties, he will be capable of combining them with those perfect forms of beauty with which he is already acquainted. In a word, by having always present to his mind the noble models already mentioned, he will form an accurate judgment of the powers of his art, and will draw rules from his own mind.

There are, however, two ways of imitating nature. In the one, a single object occupies the artist, who endeavours to represent it with precision and truth; in the other, certain lines and features are taken from a variety of objects, and combined and blended into one regular whole. All kinds of copies belong to the first kind of imitation; and productions of this sort must necessarily be executed in a confined and servile manner, with high finishing, and little or no invention. But the second kind of imitation leads directly to the investigation and discovery of true beauty,—

of that beauty whose perfect idea is only to be found within the mind.

*Different Modes of Process in Sculpture.*—Works of sculpture are performed, either by hollowing or excavating, as in metals, agates, and other precious stones, and in marbles of every description; or by working in relief, as in bas-reliefs, in the materials just mentioned, or in statues of metal, clay, wood, wax, marble, or stone.

The excavation of precious stones forms a particular branch of art, called intaglio, which, together with the working them in relievo, when the term camayeu is applied to them, belongs to the art of seal engraving.

The excavation of metals constitutes the art of engraving, in its various branches, on metal of any kind; and its relief comprises enchasing, casting in bronze, &c.

The process of hollowing hard stone or marble will need no particular description; especially as it is now wholly in disuse, except for the forming of letters in monumental or other inscriptions.

In working in relief, the process is necessarily different, according to the materials in which the work is performed.

As not only the beginning of sculpture was in clay, for the purpose of forming statues, but as models are still made in clay or wax for every work undertaken by the sculptor, we shall first consider the method of modelling figures in clay or wax.

Few tools are necessary for modelling in clay. The clay being placed on a stand or sculptor's easel, the artist begins the work with his hands, and puts the whole into form by the same means. The most expert practitioners of this art seldom use any other tool than their fingers, except in such small or sharp parts of their work as the fingers cannot reach. For these occasions, they are provided with three or four small tools of wood, about seven or eight inches in length, which are rounded at one end, and at the other flat and shaped into a sort of claws. These tools are called by the French ebauchoirs. In some of these the claws are smooth, for the purpose of smoothing the surface of the model, and in the others are made with teeth, to rake or scratch the clay, which is the first process of the tool on the work, and in which state many parts of the model are frequently left by artists, to give an appearance of freedom and skill to their work.

If clay could be made to preserve its original moisture, it would undoubtedly be the fittest substance for the models of the sculptor; but when it is placed either in the fire, or left to dry imperceptibly in the air, its solid parts grow more compact, and the

work shrinks, or loses a part of its dimensions. This diminution in size would be of no consequence, if it affected the whole work equally, so as to preserve its proportions. But this is not always the case: for the smaller parts of the figure drying sooner than the larger, and thus losing more of their dimensions in the same space of time than the latter do, the symmetry and proportions of the work inevitably suffer.

This inconvenience, however, is obviated by forming the model first in clay, and moulding it in plaster of Paris before it begins to dry, and the taking a plaster cast from that mould, and the repairing it carefully from the original work; by which means you have the exact counterpart of the model in its most perfect state; and you have, besides, your clay at liberty for any other work.

In order to model in wax, the artist sometimes uses his fingers, and sometimes tools of the same sort as those described for modelling in clay. It is at first more difficult to model in wax than in clay, but practice will render it familiar and easy.

*Use of the Model.*—Whatever considerable work is undertaken by the sculptor, whether bas-relief, or statue, etc., it is always requisite to form a previous model, of the same size as the intended work; and the model being perfected, according to the method before described, whether it is in clay, or in wax, or a cast in plaster of Paris, becomes the rule, whereby the artist guides himself in the conduct of his work and the standard from which he takes all its measurements. In order to regulate himself more correctly by it, he puts over the head of the model an immovable circle, divided into degrees, with a movable rule fastened in the centre of the circle, and likewise divided into parts. From the extremity of the rule hangs a line with a lead, which directs him in taking all the points, which are to be transferred from the model to the marble; and from the top of the marble is hung also a line, tallying with that which is hung from the model; by the correspondence of which two lines, the points are ascertained in the marble.

Many eminent sculptors prefer measurements taken by the compasses to the method just described; for this reason, that if the model is moved but ever so little from its level, the points are no longer the same.

This method, however, offers the best means, by which mechanical precision may be attained; but it is manifest, that enough yet remains to exercise and display the genius and skill of the artist. For, first, as it is impossible, by the means of a straight line, to determine with precision the procedure of a curve, the artist derives from this method no certain rule to guide him,

as often as the line which he is to describe deviates from the direction of the plumb line. It is also evident, that this method affords no certain rule to determine exactly the proportion, which the various parts of the figure ought to bear to each other, considered in their mutual relation and connexions. This defect, indeed, may be partly supplied by intersecting the plumb lines by horizontal ones; but even this resource has its inconveniences, since the squares formed by transversal lines that are at a distance from the figure, (though they are exactly equal,) yet represent the parts of the figure as greater or smaller, according as they are more or less removed from our point of view.

*Sculpture in Wood.*—A sculptor in wood should first take care to choose wood of the best quality, and the most proper for the work which he intends to execute. If he undertakes a large work, requiring strength and solidity, he ought to choose the hardest wood, and that which keeps best, as oak and chestnut; but for works of moderate size, pear or apple tree serve very well. As even these latter woods are still of considerable hardness, if the work consists only of delicate ornaments, the artist will find it preferable to take some more tender wood, provided it is at the same time firm and close; as, for instance, the Indian tree, which is excellent for this purpose, as the chisel cuts it more neatly and easily than any other wood.

The ancients made statues out of almost every different kind of wood. At Sicyon was a statue of Apollo made of box; the statue of Diana at Ephesus was of cedar. As these two sorts of wood are extremely hard and undecaying, and as cedar, in particular, is of such a nature as, according to Pliny, to be nearly indestructible, the ancients preferred them for the images of their divinities.

In the temple built on Mount Cyllene in honour of Mercury, Pausanias relates, that there was a statue of that god made of citron wood, eight feet in height. This wood was also much esteemed.

The cypress, likewise, being a wood not apt to spoil, nor to be damaged by worms, was also used for statues, as were the palm tree, olive, and ebony, of which latter, according to Pliny's account, there was another statue of Diana at Ephesus.

Several other kinds of wood were equally employed for this purpose, even the vine, of which the same author says there were statues of Jupiter, Juno, and Diana.

Felibien speaks of a French artist at Florence, of the name of Jauni, who executed several statues in wood, in a style of finishing equal to marble, and particularly one of St. Rocque, which Vasari considered as a marvellous production.

The beauty of sculpture in wood consists in the tender manner of cutting the wood, free from all appearance of hardness or dryness.

For any work of large dimensions, even though it consists of a single figure, it is better to join together several smaller pieces of wood than to make the whole of a single large piece, which is more liable to warp and crack, on account of its not being dry at heart, although it appears perfectly dry on the outside.

No wood can be properly fit for works of this kind that has not been cut at least ten years before.

The tools used for sculpture in wood are the same as those of the joiner or cabinet maker.

*Sculpture in Stone and Marble.*—For sculpture in marble and other stone the artist must make use of tools made of good steel, well tempered, and of strength proportioned to the hardness of the material.

The first thing to be done is, to saw out from a larger block of marble a block proportioned to the size of the work which is undertaken. After this, the sculptor shapes the gross masses of the forms he designs to represent, by knocking off the superfluous parts of marble with a strong mallet or beetle, and a strong steel tool called a point.

When the block is thus hewn out agreeably to the measure previously taken for the performance of the work, the sculptor brings it nearer to the intended form by means of a finer point, and sometimes of a tool called a dog's tooth, having two points, but less sharp than the single one.

After this he uses the gradine, which is a flat cutting tool, with three teeth, but is not so strong as the point.

Having advanced his work with the gradine, he uses the chisel to take off the ridges left by the former tools; and by the dexterous and delicate use of this instrument, he gives softness and tenderness to the figure, till at length, by taking a rasp, which is a sort of a file, he brings his work into a proper state for being polished.

Rasps are of several kinds, some straight, some curved, and some harder or softer than others.

When the sculptor has thus far finished his work with the best tools he can procure, wherever certain parts or particular works require polishing, he uses pumice stone, to make all the parts smooth and even. He then goes over them with tripoli, and when he would give a still higher gloss, he rubs them with leather and straw ashes.

Besides the tools already mentioned, sculptors use also the

pick, which is a small hammer pointed at one end, and at the other formed of teeth made with good steel, and squared, to render them the stronger. This serves to break the marble, and is used in all places where the two hands cannot be employed to manage the mallet and chisel.

The bouchard, which is a piece of iron, well steeled at the bottom, and formed into several strong and short points like a diamond, is used for making a hole of equal dimensions, which cannot be done with cutting tools. The bouchard is driven with the mallet or beetle, and its points bruise the marble and reduce it to powder. Water is thrown into the hole from time to time, in proportion to the depth that is made, to bring out the dust of the marble, and to prevent the tool from heating, which would destroy its temper; for the freestone dust, on which tools are edged, is only moistened with water to prevent the iron from heating, and taking off the temper of the tool by being rubbed dry; and the trepens are wetted for the same reason.

The sculptor uses the bouchard to bore or pierce such parts of his work as the chisel cannot reach without danger of spoiling or breaking them. In using it, he passes it through a piece of leather, which leather covers the hole made by the bouchard, and prevents the water from squirting up in his face.

The tools necessary for sculpture on marble or stone are, the roundel, which is a sort of rounded chisel; the houguet, which is a chisel squared and pointed; and various compasses to take the requisite measures.

The process of sculpture in stone is the same as in marble, except that the material being less hard than marble, the tools used are not so strong, and some of them are of a different form, as the rasp, the handsaw, the ripe, the straight chisel with three teeth, the roundel, and the grater.

If the work is executed in free-stone, tools are employed which are made on purpose, as the free-stone is apt to scale, and does not work like hard stone or marble.

Sculptors in stone have commonly a bowl in which they keep a powder, composed of plaster of Paris, mixed with the same stone in which their work is executed. With this composition they fill up the small holes, and repair the defects which they meet with in the stone itself.

## Section VI.—Pottery and Porcelain.

Porcelain may be regarded as the finest kind of pottery; the art of which consists in working and moulding plastic earths,

more or less simple, into hard brittle vessels of various kinds and forms, and designed for various purposes.

The essential material of pottery is clay, which alone possesses the two requisite qualities of being in its natural state so plastic that with water it becomes a soft uniform extensible mass, capable of assuming and retaining any form; and when thoroughly dried, and it has undergone a red heat for a time, of losing this plasticity, becoming irretentive of water to any considerable degree, hard, close in texture, and able more or less perfectly to confine all liquids contained within its hollow.

Clay, however, is in all instances a very compound substance; it owes its plasticity to alumine, which forms a constituent part of it; but the proportion of alumine varies considerably in different species, and almost as much as the other substances with which it is combined.

It may hence be supposed, that many of the impure-coloured natural clays are of themselves sufficiently mixed with other earths for the potter's use without any addition; but the white and finer clays mostly require dilution with silex in some form or other, which may be done to a considerable extent, without taking away the plasticity requisite for working.

The most important circumstances requisite to be considered in selecting the materials for pottery are plasticity, contractility, solidity, and compactness after drying, colour, and fusibility.

The plasticity seems to be simply owing to the proportion of clay used, or relatively to the original plasticity of the clay itself; for all clays are not equally plastic, and the superadded substances in no instance increase this property, and in many cases considerably diminish it.

The texture, including the qualities of hardness and compactness, depends partly on the mixture of siliceous (flinty or sandy) ingredients with the clay, and partly on the heat employed in the burning of the pottery. The purer natural clays are almost infusible in any furnace heat; their hardness is nearly progressive with the intensity of the fire; but they have the essential defects of drying very slowly, of shrinking very considerably, and of becoming rifty or full of minute cracks when dried, so as on this account to be porous. It is therefore necessary to mix them intimately with any other earth of qualities opposite to those of clay; that is, which absorbs but little water, and quickly parts with it (qualities directly opposite to plasticity), and which dries compact and close.

The colour of the earths used is also of essential importance in the finer pottery, in which the great desideratum is to find a clay

which after burning remains perfectly white. The appearance before burning cannot always be depended upon, for though in general the whitest clays before burning are those that remain white afterwards, it is only in a few districts that clays are to be found that retain a perfect whiteness. Thus, there exists at the foot of a range of high hills, that directly overlook the Staffordshire potteries, a stratum of white clay, to appearance fully equal, if not superior, to the best Devonshire clays, which cannot be employed for fine pottery, from its acquiring in burning a yellowish cream colour, which no art can correct. This colour is supposed to depend on an intermixture of iron.

The fusibility of clays and of other pottery earths, is a subject of extreme importance, as it is this property that principally constitutes the difference between common pottery and porcelain.

The most perfect and beautiful porcelains of Japan and China, are composed of two distinct earths; one in which silex predominates, and which melts in a strong fire; and another, which is infusible *per se;* and by the union of those two earths, a porcelain is produced, which scarcely vitrifies at the utmost furnace heat which art can excite. This substance possesses the combined excellences of great hardness, beautiful semi transparency, exquisite whiteness, where not artificially coloured, strong toughness and cohesion; so that it has strength enough for the purposes for which it is designed when made very thin, and bears sudden heating and cooling without cracking.

Of the beautiful European porcelains which have been made in imitation of the oriental, it does not appear that any of them unite all its excellences.

The manufacture of the ordinary pottery is on the whole very simple, where a due selection of materials is made; but the ornamental branches of it, such as those of modelling, enamelling, painting, and gilding, which often display exquisite beauty, are accompanied with much delicacy, and require a combination of perseverance, skill, and practical nicety of management, that are rarely equalled in any other chemical manufacture.

An intimate mixture of the ingredients used in pottery is of great importance to the beauty, compactness, and soundness of the ware. Formerly the wet clay, and ground flint, or whatever else was employed, were beaten together with long-continued manual labour, no more water being added than was necessary to render the clay thoroughly plastic. This laborious and expensive method has now been laid aside in the larger potteries; and the ingenious method has been substituted of bringing each material first to an impalpable powder, and diffusing them separately in as much

water as will bring them to the consistence of thick cream, mixing them in due proportion by measure, and then thoroughly stirring together, evaporating the superfluous water till the mass is brought to a proper consistence for working.

In the Staffordshire process the materials are a fine clay, brought chiefly from Devonshire, and a siliceous stone called chert, or else common flint reduced to powder by heating it red-hot, quenching it in water, and then grinding it by wind-mills. Each material is passed through fine brass sieves, then diffused in water, mixed by measure, and brought to a plastic state as above.

The wheel and lathe are the chief, and almost the only instruments made use of; the first for large works, and the last for small. The potter's wheel consists principally in the nut, which is a beam or axis, whose foot or pivot plays perpendicularly on a free-stone sole or bottom. From the four corners of this beam, which does not exceed two feet in height, arise four iron bars, called the spokes of the wheel; which forming diagonal lines with the beam, descend, and are fastened at bottom to the edges of a strong wooden circle, four feet in diameter, perfectly like the felloe of a coach-wheel, except that it has neither axis nor radii, and is only joined to the beam, which serves it as an axis, by the iron bars. The top of the nut is flat, of a circular figure, and a foot in diameter; and on this is laid the clay which is to be turned and fashioned. The wheel, thus disposed, is encompassed with four sides of four different pieces of wood, fastened on a wooden frame; the hind piece, which is that on which the workman sits, is made a little inclining towards the wheel; on the fore piece is placed the prepared earth; on the side-pieces he rests his feet, and these are made inclining to give more or less room. Having prepared the earth, the potter lays a round piece of it on the circular head of the nut, and sitting down, turns the wheel with his feet, till it has got the proper velocity; then, wetting his hands with water, he presses his fist or his finger-ends into the middle of the lump, and thus forms the cavity of the vessel, continuing to widen it from the middle; and thus turning the inside into form with one hand, while he proportions the outside with the other; the wheel constantly turning all the while, and he wetting his hands from time to time. Where the vessel is too thick, he uses a flat piece of iron, somewhat sharp on the edge, to pare off what is redundant; and when it is finished, it is taken off from the circular head, by a wire passed underneath the vessel.

The potter's lathe is also a kind of wheel, but more simple and slight than the former; its three chief members are an iron beam, or axis, three feet and a half high, and two feet and a half in

diameter, placed horizontally at the top of the beam, and serving to form the vessel upon; and another large wooden wheel, all of a piece, three inches thick, and two or three feet broad, fastened to the same beam at the bottom, and parallel to the horizon. The beam or axis turns by a pivot at the bottom in an iron stand. The workman gives the motion to the lathe with his feet, by pushing the great wheel alternately with each foot, still giving it a greater or lesser degree of motion, as his work requires. They work with the lathe, with the same instruments, and after the same manner, as with the wheel. The mouldings are formed by holding a piece of wood or iron, cut in the form of the moulding, to the vessel, while the wheel is turning round; but the feet and handles are made by themselves, and set on with the hand; and if there be any sculpture in the work, it is usually done in wooden moulds, and stuck on piece by piece on the outside of the vessel.

Handles, spouts, &c. are afterwards fixed on to the moulded piece, if required; and it is then set to dry for some days in a warm room, where it becomes so hard as to bear handling without altering its shape. When dry enough, it is inclosed along with many others in baked clay cases of the shape of bandboxes, called seggars, which are made of the coarse clays of the country. These are next ranged in the kiln or furnace so as to fill it, except a space in the middle for the fuel. Here the ware is baked till it has remained fully red hot for a considerable time, which in the larger kilns consumes ten or fifteen tons of coals; after which the fire is allowed to go out, and when all is cooled, the seggars are taken out, and their contents unpacked.

The ware is now in a state of biscuit, perfectly void of gloss, and resembling a clean egg shell. In order to glaze it, which is the next process, the biscuit ware is dipped in a tub containing a mixture of about sixty parts of litharge, ten of clay, and twenty of ground flint, diffused in water to a creamy consistence, and when taken out, enough adheres to the piece to give an uniform glazing, when again heated; for which purpose the pieces are repacked up in the seggars, with small bits of pottery interposed between each, and fixed in the kiln as before. The glazing mixture fuses at a very moderate heat, and gives an uniform glossy coating, which finishes the process for common white ware; though the painting and gilding require subsequent attention.

## Section VII.—Architecture.

That architecture is of great antiquity is undeniable; but the primitive buildings were very different from the specimens of architecture which we now meet with in civilized countries. In those

mild climates which seem to have been the first inhabited parts of this globe, mankind stood more in need of shade from the sun, than of shelter from the inclemency of the weather. A very small addition to the shade of the woods served them for a dwelling. Sticks laid across from tree to tree, and covered with brushwood and leaves, formed the first houses in those delightful regions. As population and the arts improved, these huts were gradually refined into commodious dwellings.

After the discovery of iron and other metals, when the axe, the hammer, the saw, and the plane, became the tools of builders, it may be supposed that houses would soon be raised to two stories, and increased in size and convenience. To make artificial and equally shaped stones, by burning clay into bricks, was a further invention of great importance, because it affords for building an universal material, as durable as stone, without the expense of carriage, and often with less labour than was required to dig and fashion the stone. The first cement for walls was either mud or clay; but in due time experiment led to the preference of a mixture of lime, sand, and water; to which, for durable plastering, the hair of oxen is now added. Simple as is the contrivance of chimneys to carry off smoke, yet they are a recent invention, and, in building houses, were unknown till within the last five hundred years. The means of letting in light, and at the same time keeping out the cold, is also a recent invention. That useful transparency called glass was discovered by accident. Some Phœnician carriers of soda, happening to light their fire between some lumps of this mineral, it melted, and mixing with the sand, produced glass. Soda, with sand or flints, melted together, are still the materials of which glass is made.

After the art of building had attained what was useful and necessary, luxury aimed at ornament; an ingenious carpenter became a carver; and an ingenious stone-mason, a sculptor. The five orders of architecture were successively invented in ancient Greece and Italy.

The Greeks borrowed many of their arts from their Asiatic neighbours, who had cultivated them long before. It is highly probable that architecture travelled from Persia into Greece. In the ruins of Shushan, Persepolis, or Tehiminar, are to be seen the first models of every thing that distinguishes Grecian architecture. There is no doubt, we suppose, among the learned, as to the great priority of these monuments to any thing that remains in Greece; especially if we take into account the tombs of the mountains, which have every appearance of greater antiquity than the remains of Persepolis. In these tombs we see

the whole ordonnance of column and entablature, just as they began to deviate from their first and necessary forms in the wooden buildings. We have the architrave, frize, and cornice; the far projecting mutules of the Tuscan and Doric orders; the modillions, no less distinct; the rudiments of the Ionic capital; the Corinthian capital in perfection, pointing out the very origin of this ornament, viz. a number of long graceful leaves tied round the head of the column with a fillet: a custom which we know was common in their temples and banqueting rooms. Where the distance between the columns was great, so that each had to support a weight too great for one tree, we see the columns clustered or fluted, &c. In short, we see every thing of the Grecian architecture, but the sloped roof or pediment: a thing not wanted in a country where it hardly ever rains. In the stone buildings of the Greeks, the roofs were imitations of the wooden ones; hence the lintels, flying cornices, ceilings in compartments, &c.

The ancient Egyptian architecture seems to be an improvement on the hut built of clay, or unburnt bricks mixed with straw; every thing is massive, clumsy, and timid; small intercolumniations, and hardly any projections.

The Arabian architecture seems a refinement on the tent. A mosque is like a large camp, consisting of a number of little bell-tents, stuck close together round a great one. A caravansary is a court surrounded by a row of such tents, each having its own dome. The Greek church of St. Sophia, at Constantinople, has imitated this in some degree; and the copies from it, which have been multiplied in Russia, as the sacred form of a Christian church, have adhered to the original model of clustered tents in the strictest manner. We are sometimes disposed to think that the painted glass (a fashion from the East) was an imitation of the painted hangings of the Arabs.

The Chinese architecture is an evident imitation of a wooden building. Sir George Staunton says, that the singular form of their roofs is a professed imitation of the cover of a square tent.

The great incorporation of architects who built most of the cathedrals of Europe, departed entirely from the styles of ancient Greece and Rome, and introduced another, in which arcades made the principal part. Not finding in every place quarries from which blocks could be raised in abundance, of sufficient size for forming the far-projecting cornices of the Greek orders, they relinquished these proportions, and adopted a style of ornament which required no such projections; and having substituted arches for the horizontal architrave or lintel, they were able to erect buildings of vast extent with spacious openings, and all this with very small

pieces of stone. The form which had been adopted for a Christian temple occasioned many intersections of vaultings, and multipled the arches exceedingly. Constant practice afforded opportunities of giving all possible varieties of these intersections, and taught the art of balancing arch against arch, in every variety of situation. In a little time, arches became their principal ornament; and a wall or ceiling was not thought properly decorated till it was filled full of mock arches, crossing and butting on each other in every direction. In this process in their ceilings these architects found that the projecting mouldings, which we now call the Gothic tracery, formed the chief support of the roofs. The plane surfaces included between those ribs, were commonly vaulted with very small stones, seldom exceeding six or eight inches in thickness. This tracery, therefore, was not a random ornament. Every rib had a position and direction that was not only proper, but even necessary. Habituated to this scientific arrangement of the mouldings, they did not deviate from it when they ornamented a smooth surface with mock arches; and in none of the highly ornamented ancient buildings shall we find any false positions. This is far from being the case in most of the modern imitations of this species of architecture.

We call the middle ages rude and barbarous, and give to their architecture the appellation of Gothic; but there was surely much knowledge in those who could execute such magnificent and difficult works.

The architects of whom we now speak do not appear to have studied the theory of equilibrated arches; but, for a long period, they adopted an arch which was very strong, and permitted considerable irregularities of pressure; we mean, the pointed arch. The very deep mouldings with which it was ornamented made the arch stones very long in proportion to the span of the arch.

They had, however, with great care, studied the mutual dependence of arches on each other; and they contrived to make every invention for this purpose become an ornament, so that the eye required it as a necessary part of the building. Thus we frequently see small buildings having buttresses on the sides. These are necessary in a large vaulted building, for withstanding the outward thrust of the vaulting; but they are useless when there is a flat ceiling within. Pinnacles on the heads of buttresses, are now considered as ornaments; but originally they were put there to increase the weight of the buttresses; even the great tower in the centre of a cathedral, which now continues its chief ornament, is a load almost indispensably necessary, for enabling the four principal columns to withstand the

combined dependences of the aisles, of the naves, and transepts. In short, the more closely we examine the ornaments of this architecture, the more shall we perceive that they are essential parts, or derived from them by imitation; and the more we consider the whole style of it, the more clearly do we see that it is all deduced from the relish for arcades, indulged in the extreme, and pushed to the limit of possibility of execution.

From the end of the fifteenth century, this architecture began to decline; and was soon after supplanted by a mixed style, if we may venture to call it so, wherein the Grecian and Gothic, however discordant and irreconcilable, are jumbled together.

The orders, as now executed by architects, are five, viz. the Tuscan, the Doric, the Ionic, the Corinthian, and the Composite; which are distinguished from each other by the column with its base and capital, and by the entablature. The Tuscan order is characterised by its plain and robust appearance, and is therefore used only in works where strength and plainness are wanted; it has been used with great effect and elegance in that durable monument of ancient grandeur, the Trajan column at Rome; indeed, general consent has established its proportions for such purposes beyond all others. The Doric possesses nearly the same character for strength as the Tuscan, but is enlivened by its peculiar ornaments; the triglyph, mutile, and guttæ, or drops under the triglyph; these decorations characterise the Doric order, and in part are inseparable from it. Its proportions recommend it, where united strength and grandeur are wanted. The Ionic partakes of more delicacy than either of the former, and therefore, as well as on account of its origin, is called feminine, and not improperly supposed to have a matronic appearance. It is a medium between the masculine Tuscan and Doric, and the virginal slenderness of the Corinthian; the boldness of the capital, with the beauty of the shafts, makes it eligible for porticos, frontispieces, entrances to houses, &c. Denteles were first added to the cornice of this order. The Corinthian possesses more delicacy and ornament than any other order; the beauty and richness of the capital, and the delicacy of the pillar, render it the most suitable in those edifices where magnificence and elegance are required. On this account it is frequently used for the internal decoration of large state rooms; in which it has a chaste appearance, though at the same time superb. The Composite order is the same as the Corinthian in its proportions, and nearly alike in ornamental properties. The addition of the modern Ionic volute to the capital, gives a bolder projection. It is applicable in the same manner and in the same cases as the Corinthian.

# CHAPTER XVII.

## GOVERNMENT, LAWS, ETC. OF GREAT BRITAIN.

The government of Great Britain has been generally termed a limited monarchy. In the great framework of the constitution, the object professedly held in view, is to steer the middle course between anarchy and despotism: to maintain a just authority in the state, without violating the rights of the subject. According to a judicious writer, "the government of England was founded on principles of liberty; its constitution is the work of a wise and brave people; who, considering that all power was derived from them, and was to be subservient to their happiness, committed it into the hands of three states, who were to be a mutual support and mutual check on each other, and yet so ordered, that the interest of each is best promoted by each confining itself within its proper bounds."

Doubtless, the constitution of Great Britain partakes of the character of all human institutions. But if we were to express an opinion, it should be, that it is neither so perfect as to need no improvement, nor so defective, as to require to be upturned from its foundation, in order to effect an amelioration. In order that our readers may judge for themselves, the following outline of British law is here introduced. The great principles are embodied in what is called the Declaration of Rights after the abdication of James II.

The Parliament, when assembled, held that James had endeavoured to subvert the constitution, and vacated the throne; but restricting their vote to the endeavour to subvert the constitution, they held, that the society was not broken up, but merely that the executive magistrate was gone; and on this principle they proceeded in a legal way to supply the deficiency. This was done by their declaration of February 12, 1688, "That William and Mary, Prince and Princess of Orange, be declared king and queen, &c." Care was now taken to repair the breaches and defects in the constitution, as far as the limited experience of circumstances would permit. The lords and commons, previous to the coronation of King William and Queen Mary, had framed a bill, which contained a declaration of the rights which they claimed in behalf

of the people, and was, in consequence, called the Bill of Rights. This afterwards received the royal assent, and became an Act of Parliament, under the title of an "Act declaring the rights and liberties of the subject, and settling the succession of the crown."

This statute declares, 1. That the pretended power of suspending laws, or the execution of laws, by regal authority, without the consent of parliament, is illegal. 2. That the pretended power of dispensing of laws, or the execution of laws, by regal authority, as it hath been assumed and exercised of late, is illegal. 3. That the commission for erecting the late court of commissioners for ecclesiastical causes, and all other commissions and courts of a like nature, are illegal and pernicious. 4. That levying money for or to the uses of the crown, by pretence of prerogative, without grant of parliament, for longer time, or in other manner than the same is, or shall be granted, is illegal. 5. That it is the right of the subjects to petition the king; and all commitments and provocations for such petitioning, are illegal. 6. That the raising or keeping up a standing army within the kingdom, in the time of peace, unless it be with consent of parliament, is against law. 7. That election of members of parliament ought to be free. 8. That the freedom of speech, and debates or proceedings of parliament, ought not to be impeached, or questioned, in any court or place out of parliament. 9. That excessive bail ought not to be required; nor excessive fines imposed; nor cruel and unusual punishments inflicted. 10. That jurors ought to be duly impanelled and returned; and jurors which pass upon men in trials for high treason, ought to be freeholders. 11. That all grants and promises of fines, and forfeitures of particular persons, before conviction, are illegal and void. 12. And that for redress of all grievances, and for the amending, strengthening, and preserving of the laws, parliaments ought to be held frequently. And they do demand, and insist upon all and singular the premises, as their undoubted rights and liberties; and that no declarations, judgments, doings or proceedings, to the prejudices of the people in any of the said premises, ought in any wise to be drawn hereafter into consequence or example.

The constitution, as it now exists, embraces three principal divisions, the *legislative, judicial,* and *executive* authority.

The LEGISLATIVE AUTHORITY inheres in the parliament of the realm. This august body consists of the king's majesty, sitting there in his royal political capacity; and the other estates of the realm, the lords spiritual and temporal, who sit together, with the king, in one house; and the commons, who sit by themselves in another. The king and three estates together form a

great corporation, or body politic of the kingdom, of which the king is said to be *caput, principium, et finis.* For upon their coming together, the king meets them in person, or by representation, without which there can be no beginning of a parliament. To prevent any encroachments on the royal prerogative, the king is a part of the legislature, and has the power of rejecting, rather than of resolving, as being sufficient to answer the end proposed. The crown cannot of itself begin any alteration in the established law; but it may approve or disapprove of alterations suggested and consented to by the two houses. The two other branches of the legislature, therefore, cannot abridge the executive of any of its rights, without its own consent; for the law must remain perpetually as it now is, unless all the states comprehended in the legislature agree to the alteration. In the legislature, the people are a check upon the nobility, and the nobles upon the people, by the mutual power possessed by each of rejecting what the other has resolved; and the king has a check upon both, by putting a negative upon their resolutions. The spiritual lords consist of two archbishops and twenty-four bishops. All these hold, or are supposed to hold, certain baronies under the king. These lords spiritual are, in the eye of the law, a distinct order from the lords temporal, and they are specifically mentioned as distinct, in the statutes of the realm; but in practice, they are usually comprehended under the title of the lords. The lords temporal consist of all the English peers, with a certain number elected by the whole body of the Scotch, and also of the Irish nobles, as representatives of that order in each of those nations; and finally, the twelve judges sit in the house of peers, *ex-officio,* during life. The number of temporal lords is indefinite, as it may be increased at the king's pleasure.

The constituent principle of the house of commons is, that in a free state, every citizen should have a vote in the affairs of government. In small states, this is best attained by the individual acting in his own person; but this is impracticable in a large community. In such a state as Britain, it is manifestly impossible; and therefore, that which cannot be attained by the personal act of every member, must be compassed by representation, and this again must be attained by election. The counties are in England represented by knights, elected by the proprietors of lands, the qualifications for which was, formerly, to be possessed of a freehold of forty shillings a year, in the county for which the member was to be elected. By the Reform Act the qualification required is a freeholder of not less than 10*l.* per annum, and with some limitations is extended to copyhold and leasehold property.

The cities and boroughs, supposed to comprehend the trading and mercantile part of the community, are represented by citizens and burgesses, who are elected by freemen and rate-payers, of those particular places.

The JUDICIAL AUTHORITY is maintained by various courts of law, with their respective jurisdictions. The principal of these are the following:

The Court of Common Pleas.—All personal pleas between one man and another are determined in this court, but they are also cognizable by the King's Bench.

The Court of King's Bench.—All pleas between the king and the subject are brought into this court: as treasons, felonies, breach of the peace, and any kind of oppression.

The Courts of Assize and Nisi Prius are derived out of, and act as collateral auxiliaries to those before mentioned.

The High Court of Chancery is designed to relieve the subject against cheats, breaches of trust, invasions of its own patents, grants, &c., and other oppressions, for which no other court can provide a remedy. The forms of proceeding in this court is, by bills, answers, and decrees.

Trial by jury is used both in civil and criminal cases. It is the province of the sheriff to return a jury, consisting of not less than forty-eight persons, nor more than seventy-two, so that out of them, twelve may be chosen to give a verdict upon the cause. In criminal causes, the prisoner is in law supposed to be innocent until he is convicted. To enable him the better to set up his defence, and prove his innocence, he is furnished with a copy of the indictment; and that he may be enabled to ascertain the characters and ability of the jurors who are to try him, and to know whether they have any personal prejudice against him, he is to be furnished with the panel, or list of their names and residences. When brought to the bar on a charge of felony, he may peremptorily, in open court, challenge twenty of the number, without assigning any reason, and as many more as he can urge a reasonable objection to, until at length twelve unexceptionable men of his neighbourhood are selected. In cases of treason, the accused may challenge to the number of thirty-five, instead of twenty, without showing cause, besides as many more as he can show sufficient cause against.

The supreme EXECUTIVE POWER of these kingdoms is entrusted to the sovereign, whether king or queen. It is a grand fundamental axiom, upon which the *jus coronæ*, or right of succession to the crown of Great Britain, depends, "that the crown is by common law and constitutional custom hereditary, and this in a

manner peculiar to itself; but that the right of inheritance from time to time may be changed, or limited by Act of Parliament, under which limitations the crown still continues hereditary." The laws having constituted the right of succession hereditary, have vested in the crowned head great authority over other branches of the royal family, particularly those whose marriages might affect the succession; and therefore by statute 12 Geo. III. c. 2, no descendant of the body of George II., other than the issue of princesses married into foreign families, is capable of contracting matrimony, without the previous consent of the king, signified under the great seal; and any marriage contracted without such consent is void. But it is provided, that such of the said descendants of George II. as are above the age of twenty-five, may, after a twelvemonth's notice given to the king's privy council, contract and solemnize marriage without the consent of the crown, unless both houses of parliament shall, before the expiration of the said year, expressly declare their disapprobation of such marriage. It is further the privilege of the sovereign, to have a great number of counsellors, for, "in the multitude of counsellors there is wisdom." Of this description is the great council of parliament; and also the peers of the realm in council, when no parliament is assembled.

But the advisers of the royal person, chiefly, are his privy council. This Sir Edward Coke describes as a noble, honourable, and reverend assembly of the king; and such as he wills to be of his privy council in the king's court or palace. The oath of a privy counsellor consists of seven articles, expressive of his duties. 1. To advise the king according to the best of his cunning and discretion. 2. To advise for the king's honour and the good of the public, without partiality through affection, love, need, doubt, or dread. 3. To keep the king's counsel secret. 4. To avoid corruption. 5. To help and strengthen the execution of what shall be there resolved. 6. To withstand all persons who would attempt the contrary. And lastly, in general, 7. To observe, keep, and do all that a good and true counsellor ought to do to his sovereign lord. The authority of the privy council is in many subjects very great; they have power to issue a warrant to bring persons before them on any inquiry into offences against the government, and may commit offenders to safe custody to take their trial; but in this case, also, the legislature has been so jealous over the liberty of the people, that a person committed by the privy council may have his habeas corpus, by statute 16 Car. I. c. 10. The existence of this council depends entirely upon the will of the sovereign; he may dismiss any member

at his pleasure, or he may dissolve the whole body, and appoint another.

On the death of the reigning prince, the next heir immediately succeeds to the crown, and is *ipso facto* the sovereign; so that it is held the king never dies, or rather, the regal office is never unoccupied, and therefore, by such an event, no vacancy of the throne occurs.

From the preceding observations, it appears that the king of England is invested with great powers, but these can only be supported by a sufficient supply of money; and the representatives of the people, by reserving to themselves the right of taxation, have taken the most effectual measures to prevent the arbitrary exercise of the royal prerogative. The people have, therefore, in that single privilege of granting or refusing supplies to the crown, reserved a power which will enable them to maintain the integrity of the constitution, as it enabled their ancestors to obtain its establishment. The king, though endowed with such high attributes, has scarcely any revenue but by grant of the people.

But it is further observable, that other barriers are established to guard against any sudden usurpations on the part of the crown, and to afford the people an opportunity of obtaining constitutional redress. A free press is one of the most formidable weapons that can be wielded against despotic governments; but especially in a state where every man boasts of the freedom of the constitution under which he lives, the press is an engine of immense power. The liberty of the press does not consist in any one being able to publish any thing he pleases with impunity, but in being at liberty to publish whatsoever he pleases, merely subject afterwards to judicial investigation by a jury, upon the principles we have already specified.

The right of petitioning is another support of public liberty, which is now held to be the right of inheritance by birth of every Briton. It is indeed subjected to some limitations, but still these are rather of a nature to preserve the public tranquillity than to endanger the constitution.

It is held as a grand principle of the constitution, that parliament should be often assembled; and if assembled, they will, it is presumed, be sufficient restraint upon any unconstitutional measures adopted by the ministers of the crown. But it is possible, that a minister determined to carry every thing with a high hand, or fearing parliamentary investigation of certain parts of his administration, might persuade his sovereign to dispense with the use of parliaments. This indeed cannot be done constitutionally for any length of time, as the statute 6 W. and M. c. 2,

enacts, that a new parliament shall be called within three years from the expiration of the former.

And, finally, another security for personal liberty consists in the subjection of the military force to the civil authorities, in all cases of riot and public breach of the peace, except open rebellion, and consequent proclamation of martial law.

On a review of the constitutional authorities of this kingdom, one question of vital importance presents itself for our consideration. By what means is the state most endangered? and consequently, what object should be contemplated with the greatest degree of jealousy, by all the friends of constitutional rights? On this subject we cannot hesitate long. We have no great apprehensions, in the present state of things, of any direct and flagrant abuse of a standing army, or of the subversion of trial by jury; much less of the disuse of parliaments. It is in the immense increase of the revenue, and the vast patronage consequent upon that increase, placed in the hands of the sovereign, that the principal danger consists. The numerous places that are the gift of the executive, and the vast salaries paid to so many persons, must necessarily give that department of the state an immensely preponderating influence. It insinuates itself into both houses of parliament; and before the Reform Act, produced a very serious monopoly of the small boroughs which returned members.

By that memorable statute, besides other important enactments, fifty-six of those boroughs, which had been a source of corruption for ages, were entirely disenfranchised; thirty which had before sent to parliament two members, had their return reduced to one member; forty-two new boroughs were constituted, twenty-two of which return two, and twenty return one member. By this equalization of the representation, as well as by the more popular character of the elective franchise in many respects, the power of the ministers of the crown to act in opposition to the voice of the people, is materially limited. The beneficial effects of this measure have been felt by the passing of many enactments favourable to the cause of equity, justice, and economy of the public expenditure, which would probably, under the former state of things, have never been carried. And although the friends of equal representation consider that they have many just grounds of complaint in the present working of the system, either for want of further legislative enactions, or from the imperfect and partial enforcement, in many instances, of the present laws, yet it is admitted, that many valuable improvements have been effected in the details of the British constitution, and (in the opinion of a large majority of the British people) without undermining those great principles on which it is based.

# CHAPTER XVIII

## CHRISTIANITY.

Among the various systems of religion, Christianity, or the religion taught by Jesus Christ, stands pre-eminent; as the last and most perfect dispensation of divine truth, and that by which all who have been made acquainted with it, must finally be judged. In the early ages of the world, the Divine Being made himself known to man, as we are informed in the Scriptures, "at sundry times and in divers manners." But all the previous revelations had reference to *Christ* as the future *Messiah*. These words are of similar import. Messiah is a Hebrew word; and hence in the Old Testament we never read of Christ, that being the Greek word for the same person. Both Messiah and Christ signify anointed. Hence it is said, John i. 41, "We have found the Messiah, which is, being interpreted, the Christ."

This glorious personage made his advent into the world about 4000, or 4004 years after the creation; and it appears suitable, in giving an account of the religion which he promulgated, first to take notice of some leading circumstances connected with his advent. Many predictions had been uttered concerning him, not only ages, but even thousands of years before he appeared; and these at the time of his birth and ministry, were in the possession of the most inveterate enemies. Those prophecies described his sufferings, death, and resurrection; and foretold the astonishing success of his religion in the world. At the time that the government was "departing from Judah, and the lawgivers from between his feet," Gen. xlix. 10; and when the 490 years were fulfilled, which were spoken of to Daniel by the angel Gabriel, Dan. ix. 24; the Son of God, who was in the bosom of the Father, made his appearance. Previous to this period there had been a great shaking among the nations, by the subversion of the Persian and Grecian empires, and the establishment of the Roman upon their ruins. At this time, the second temple was in its glory; a general expectation prevailed among the Jews, from the prophecies they possessed, that their Messiah would shortly come; and among

heathen nations, an alarming rumour had been circulated of a Jew who should arise to subdue and govern the world. Under these circumstances of general and anxious expectation Christ came. After being in a public way baptized with water, and on that occasion also baptized with the Holy Ghost, as a means of anointing him to the office of a public teacher, he continued to instruct his countrymen for about the term of three years and a half, at the expiration of which time he was crucified; but, notwithstanding this effort of his enemies to destroy him, he arose on the third day after his death and burial, and appeared unto many persons; and eventually, after repeated appearances during about six weeks, he ascended up into heaven in the full view of his disciples: "Go ye, therefore, and teach all nations, baptizing them in the name of the Father, and the Son, and of the Holy Ghost; teaching them to observe all things whatsoever I have commanded you; and, lo, I am with you alway, even unto the end of the world." From this commission, therefore, we must date the rise of the christian religion.

At the time when Christ appeared, the Jews were governed by Herod the Great, under the authority of Augustus Cæsar. By Herod, luxury and vice were introduced among the Jewish nation, until the whole body of the people were corrupted to a high degree of licentiousness; and those degrading habits tended to render them an easy prey to his cruel practices, unjust exactions, and imperious disposition. Judea, through this whole reign, groaned under the combined influence of profligacy, among all ranks of the community, and the vilest tyranny on the part of the government. On the death of Herod the Great, his kingdom was divided among his sons; half of it was given to Archelaus, with the title of Exarch; but this prince was so corrupt, that even the Jews and Samaritans united in a petition against him to the Roman emperor, Augustus Cæsar, from whom he had received the government, and who on this application, after hearing the cause, banished Archelaus from his dominions, and reduced Judea to a Roman province. About the sixteenth year of Jesus Christ, Pontius Pilate was appointed governor of Judea. Under him Christ was crucified; and in about seven years after that memorable transaction, Pilate was recalled by the Roman emperor, and sent into exile for his crimes. The Jews were at this time in a most degraded state of civil bondage. The whole nation suffered much from the presence of the idolatrous Romans, constantly among them; and the exactions of the publicans became most oppressive and intolerable. But to aggravate their circumstances still more, their own rulers greatly contributed to their

calamities; for having purchased their offices in the priesthood, or their seats in the sanhedrim, by bribes or other acts of gross curruption, they maintained their authority by the most abominable crimes, and remunerated themselves by unjust exactions on the body of the people. By these means iniquity spread like an overwhelming flood over the whole land; private extortions became common; immense gangs of robbers were formed, which even the force of the government was scarcely able to restrain or subdue; and iniquity of every kind increased to such a height, that any serious observer of the state of the nation might have perceived, several years before the great rebellion of the Jewish nation against the Roman power and their consequent subversion, that the government and whole community were verging fast to destruction.

Various sects at this time existed among the Jews; but the four principal were the Pharisees, Sadducees, Essenes, and Herodians.

The Pharisees arose, it is supposed, about 150 years before the birth of Christ. They denominated themselves Pharisees, or separatists, as distinguishing themselves from others, by a profession of great strictness and sanctity. But this denomination, although it involved separation from the other descendants of Abraham, as well as from the heathen, consisted chiefly of distinctions respecting food, ceremonies, and the mere externals of religion. This sect had rendered themselves extremely popular by their pretensions to sanctity, and especially by uniting with those pretensions a considerable share of Jewish learning.

The Sadducees derived their name from Zadoc, or Sadoc, who flourished about A. C. 280. His master Antigonus taught, that our service of God should be perfectly disinterested, and resulting from pure love to God, and, consequently, quite irrespective of future rewards or punishments. Zadoc on this ground assumed, that there were no such rewards nor punishments. The followers of this teacher asserted, that God is the only immaterial being; that there is no created angel or spirit; and that there will not be any resurrection of the body. They rejected all traditions; adhered closely to the text of the sacred books; but, in common with the other Jews, preferred the five books of Moses to all the other inspired writings.

The Essenes are supposed to have arisen soon after the dispersion of the Jews occasioned by the Babylonish captivity. They maintained, that rewards and punishments extended to the spirit only; and considered the body as a mass of malignant matter, merely the prison of the immortal mind. In many respects they appear to have been little else than a description of

rigid Pharisees, who lived in a way not very dissimilar from the monks of the Romish church.

The last principal sect among the Jewish people were the Herodians. M. Simon, in his notes on Matthew, chap. xxii., considers this sect to have been such as adhered to the party and interest of Herod, and endeavoured to maintain the succession to the crown in his family. Dr. Prideaux was of opinion, that they were distinguished from other Jews, by their concurrence with Herod the Great, in his scheme of subjecting the nation to the will of the Romans, not excepting conformity to many of their idolatrous customs. This symbolizing with heathenism upon views of worldly policy, probably, was that "leaven of Herod," against which Jesus Christ cautioned his disciples. Herod seems to have formed this sect to keep him in countenance, in many of his heathenish practices, and accommodating submission to Roman influence.

Having briefly stated the religious sectarian denominations of the Jews, we proceed to notice a few of the prominent features of the state of the heathen world at the period of Christ's advent, and more especially of the apostle's mission. The Roman monarchy had, at that time, risen to an astonishing height of power and splendour, so that it was called from the extent of dominion, *the world*, and *all the world*. Judea was subjugated by this power about seventy years before the christian era; and the Jewish rulers from that time acknowledged their dependence upon a heathen government. The Roman monarchy still continued to extend its conquests, and about the time of Christ's birth had, according to the prediction of Daniel, "trodden down all other kingdoms of the earth, and devoured them." But while the Romans subjugated the nations of Europe and Asia Minor, the detail of which the reader may consult at his leisure in the first chapter of Gibbon's Roman Empire, they united them under one general description of government, civilized them, introduced among them the arts, and widely circulated the knowledge of the Latin tongue. By these means, when the disciples of Jesus Christ began to preach, the providence of God, which had ever since the creation been preparing for the disclosure of the august personage, denominated Wonderful, Counsellor, the mighty God, the everlasting Father, the Prince of Peace, now furnished numerous facilities for promulgating in very distant regions those truths which otherwise might not have reached them for many generations. The Augustan age, in which Christ appeared, is universally acknowledged to have been the most learned and polite the world ever saw; and yet while the love of literature seemed to be

almost an universal passion, superstition and idolatry, under their grossest forms, blinded and fettered the human mind. Each nation had its own gods, over which one was understood to preside; the number of deities was augmented to an immense amount; and the rites by which they were worshipped were not only superstitious, but barbarous, and often obscene.

The Roman and the eastern idolaters differed in a variety of points, and probably those of the uncivilized regions of the earth still more. The prophetic language of Isaiah seemed now to be fully verified, especially taken in connexion with the birth and ministry of Jesus Christ, and the mission of the apostles; "Behold the darkness shall cover the earth, and gross darkness the people; but the Lord shall arise upon thee, and his glory shall be seen upon thee. And the Gentiles shall come to thy light, and kings to the brightness of thy rising." "The noblest people," says Dr. Robertson, "that ever entered upon the stage of the world, appear to have been only instruments in the divine hand for the execution of wise purposes concealed from themselves. The Roman ambition and bravery paved the way, and prepared the world, for the reception of the christian doctrine. They fought and conquered, that it might triumph with the greater ease, Isaiah x. 5—7. By means of their victories, the overruling providence of God established an empire which really possesses that perpetuity and eternal duration, which they vainly arrogated to their own. He erected a throne which should continue for ever, and of the "increase of that government there shall be no end."

The philosophy of the heathen world at this important period, was of two kinds. The one seems to have taken its rise among the Grecian states, and probably in the very early periods of their history, of which we have no authentic information. This, which has generally been called the *Grecian philosophy*, was adopted from them by the Romans, and became very prevalent through the whole Roman empire. At this period, the worship of the gods of the conquered provinces was very fully tolerated. The other description of philosophy, which prevailed chiefly in Persia, Syria, Chaldea, and Egypt, was called science, or knowledge, and has generally been known by the name of the *oriental philosophy*. Both descriptions of philosophers were subdivided into many different sects.

Among the Grecians, we notice six as most eminent. 1. The Platonic, the essence of which was, that there is one God, an eternal, immutable, and immaterial being, perfect in wisdom and goodness, omniscient, and omnipresent. 2. The Aristotelian, or Stagirite. The author of this philosophy was born about

A. C. 384. He believed the universe to have existed from eternity, but still acknowledged a Deity, whom he denominated the first mover. But he supposed, that this being dwelt in some first sphere of the universe, and was so happy in his own contemplations, as to have no respect to human affairs. 3. The Stoical. This sect was founded by Zeno, a Cyprian. He taught, that God actuates all things as a kind of soul to the universe; that all men have naturally some seeds of knowledge; that wisdom alone makes men happy; and that pain, poverty, and the various afflictions of life, are but supposititious evils; and finally, that a wise man ought not to be affected with the passions either of joy or grief. 4. The Epicurean. Their founder flourished about A. M. 3700. The principles he inculcated seem to have been chiefly that the world came into form quite irrespective of any divine agency, and merely by a fortuitous combination of atoms; that there is no providence; that the soul is not immortal, nor are there any spiritual beings, as angels; and that happiness consists in the tranquillity of the mind, arising from the practice of some moral virtue. 5. The Sceptical. They were also denominated the Pyrrhonic sect, from their teacher Pyrrho, a Grecian philosopher. These endeavoured rather to destroy other systems than erect one of their own. They professed to assert nothing, but to remain in doubt on every subject, as though truth were no where attainable. 6. The Eclectic. This sect was founded by Potamon of Alexandria. They were weary of doubting every thing as taught in the schools of scepticism. They held, that the mind of man is originally a portion of the divine, but being fallen into a state of darknesss and defilement by its union with the body, it must be emancipated from the fetters of matter, and rise to the knowledge and vision of God by contemplation; that the object of philosophy is to liberate the soul from its corporeal imprisonment; and, that this is greatly to be effected by abstinence, mortification of the flesh, and religious duties.

The oriental philosophy was perhaps yet more widely diffused than the Grecian. This description of philosophy was highly popular at the time of Christ's ministry; and most unhappily was blended with Christianity, by many professed converts to the latter faith, as it had been previously with Judaism, by the degraded sons of Abraham. Oriental philosophy professed to explain the origin and properties of all things, by the principle of emanation from an eternal fountain of being. Zoroaster, the ancient Persian philosopher, is said to have systematized the leading doctrines deduced from this fundamental principle; but it is probable all his notions were primarily derived from revelation, through the

medium of the Jews. He maintained, that spirit and matter, light and darkness, are emanations from one eternal source, and that there are two principles, the one active, the other passive, which are perpetually at variance; the one teaching to good, and the other, to evil; but that, through the influence of the eternal Supreme Being, the contest will eventually terminate in favour of the good principle. According to the oriental philosophy, a vast variety of orders of spiritual beings, both gods and demons, have proceeded from the Deity, which are more or less perfect, as they are at a greater or less distance in the course of emanation from the eternal fountain of being and intelligence; they maintain that the soul of man is a spark of divine emanation; and that matter is the last and most distant creature in the process of emanation. On these general principles, a variety of others of a minor description were founded; upon these, therefore, as so many data, the oriental, as well as Grecian philosophy, was divided into numerous sects. The Gnostic sects, which were so numerous in the first ages of the christian church, are to be traced chiefly to the oriental philosophy. Other sects were formed by attempting to blend Judaism with Christianity; and many more by the professed conversion of the disciples of the Greek and Roman schools to the faith of Christ; and their laboured efforts to accommodate their newly-received principles to those of their old philosophy.

After this hasty glance at those religions which Christianity was intended to supersede, we are desirous of leading the attention of the reader to the constituent principles of that faith "which at the first began to be spoken by the Lord, and was confirmed unto us by them that heard him, God bearing them witness both with signs and wonders, and with divers miracles, and gifts of the Holy Ghost, according to his own will."

Christianity teaches:—1. That the Scriptures of the Old and New Testament were "given by inspiration of God," 2 Tim. iii. 16. That "holy men of God spake as they were moved by the Holy Ghost," 2 Pet. i. 21. That they are "profitable for doctrine, for reproof, for correction, for instruction in righteousness, that the man of God may be perfect, thoroughly furnished unto all good works," 2 Tim. iii. 16.

2. That "there is one God," 1 Tim. ii. 5, "who is a spirit," John iv. 24. That this God is "the Father of all, above all, through all, and in all," Eph. iv. 6. That "there are three that bear record in heaven, the Father, the Word, and the Holy Ghost; and these three are one," 1 John v. 7. That Christ is "the only-begotten Son of God," John iii. 18. That he is called the *Logos*, or Word; and "in the beginning was the Word, and the Word was with God,

and the Word was God; all things were made by him, and without him was not any thing made that was made," John i. 1—3; that he is "the brightness of the Father's glory, and the express image of his person," Heb. i. 3; and "that the Holy Ghost is the eternal Spirit," Heb. ix. 14.

3. That "God made man in his own image," Gen. i. 27; that "by one man's disobedience many were made sinners, as sin entered into the world, and death by sin; and so death passed upon all men, for that all have sinned, Rom. v. 12; and that "the wrath of God is revealed from heaven against all ungodliness and unrighteousness of men," Rom. i. 18.

4. That the mercy of God has been expressed in the exhibition of a Saviour, for "when the fulness of time was come, God sent forth his Son, made of a woman, made under the law, to redeem them that were under the law, that we might receive the adoption of sons," Gal. iv. 4, 5; that "God sent not his Son into the world to condemn the world, but that the world through him might be saved," John iii. 16, 17; that Christ "bore our sins in his own body on the tree," 1 Peter ii. 24; and so "suffered the just for the unjust, that he might bring us to God.

5. That "except a man be born again, he cannot see the kingdom of God," for "that which is born of the flesh is flesh, and that which is born of the spirit is spirit," John iii. 6; that "if any man be in Christ he is a new creature; old things are passed away, behold, all things are become new," 2 Cor. v. 17. That Christians shall be "sanctified wholly, and their whole spirit, soul and body, be preserved blameless unto the coming of our Lord Jesus Christ," 1 Thess. v. 23, in order that they "may walk worthy of the Lord unto all pleasing, being fruitful in every good work, and increasing in the knowledge of God," Col. i. 10.

6. That "by the law is the knowledge of sin," Rom. iii. 20; and "the law was our schoolmaster," Gal. iii. 26; that, therefore, "by the deeds of the law, there shall no flesh be justified in the sight of God," Rom. iii. 20, for we are "justified freely by his grace, through the redemption that is in Jesus Christ," Rom. iii. 24.

7. That as Christ is "the shepherd and bishop of souls," 1 Pet. ii. 25, "his sheep shall never perish, neither shall any pluck them out of his hands," John x. 28; for "he that hath begun a good work in us will perform it unto the day of Jesus Christ," Phil. i. 6; and, therefore, that "we are kept by the power of God through faith unto salvation," 1 Pet. i. 5.

8. That "the dead shall be raised," 1 Cor. xv. 52, for "Christ being raised is become the first-fruits of them that slept," 1 Cor. xv. 20; and that hence "the apostles preached through Jesus the

resurrection of the dead," Acts iv. 2. That, "as it is appointed unto men once to die, and after this the judgment," Heb. ix. 27, so, therefore, "we must all appear before the judgment-seat of Christ, that every one may receive the things done in the body, according to that he hath done, whether it be good or bad," 2 Cor. v. 10; and the wicked "shall go away into everlasting punishment, but the righteous into life eternal," Matt. xxv. 46.

9. That Jesus Christ has ordained two sacraments in his church, namely, Baptism, and the Lord's Supper; for after his resurrection he "came and spake unto them (viz. the eleven apostles), saying, All power is given unto me in heaven and in earth. Go ye, therefore, and teach all nations, baptizing them in the name of the Father, and of the Son, and of the Holy Ghost; teaching them to observe all things whatsoever I have commanded you; and lo, I am with you alway, even unto the end of the world," Matt. xxviii. 18—20. And in reference to the eucharist, we read, "the Lord Jesus, the same night in which he was betrayed, took bread; and when he had given thanks he brake it, and said, Take, eat; this is my body, which is broken for you: this do in remembrance of me. After the same manner also he took the cup, when he had supped, saying, This cup is the New Testament in my blood; this do ye, as oft as ye drink it, in remembrance of me. For as often as ye eat this bread, and drink this cup, ye do show forth the Lord's death till he come," 1 Cor. xi. 23—26.

10. That "the saints are the church of the living God," 1 Tim. iii. 15; and that "such should not forsake the assembling of themselves together," Heb. x. 25; that they should be found in the exercise of "prayer and supplication, with thanksgiving," Phil. iv. 6. That they should "love one another with a pure heart fervently," 1 Peter i. 22; and should "bear one another's burdens, and so fulfil the law of Christ," Gal. vi. 2, who said, "This is my commandment, that ye love one another as I have loved you," John xv. 12.

11. That Christians should "consider one another, to provoke unto love and to good works," Heb. x. 24. That we should "give to him that needeth," Eph. iv. 28; "not grudgingly, nor of necessity, knowing that God loveth a cheerful giver," Heb. ix. 7; and, as we have opportunity, to "do good unto all men, especially unto them who are of the household of faith," Heb. vi. 10. That "we should be ready to every good work, speak evil of no man, be no brawlers," Titus iii. 1; but be "gentle unto all men, apt to teach, patient in meekness, instructing those that oppose themselves, if God peradventure will give them repentance to the

acknowledging of the truth; and that they may recover themselves out of the snare of the devil, who are taken captive by him at his will," 2 Tim. ii. 24—26. That "supplications, prayers, intercessions, and giving of thanks, should be made for all men, for kings, and for all that are in authority," 1 Tim. ii. 1, 2. That "we should be subject to the higher powers," Rom. xiii. 1; should "honour the king," 1 Peter ii. 17; "obey magistrates," Titus iii. 1; and "lead quiet and peaceable lives, in all godliness and honesty," 1 Tim. ii. 2; "waiting for the coming of our Lord Jesus Christ, who shall confirm us unto the end, that we may be blameless in the day of our Lord Jesus Christ," 1 Cor. i. 7, 8.

Finally, Christianity pronounces the following benedictions: "Blessed are the poor in spirit, for theirs is the kingdom of heaven. Blessed are they that mourn, for they shall be comforted. Blessed are the meek, for they shall inherit the earth. Blessed are they which do hunger and thirst after righteousness, for they shall be filled. Blessed are the merciful, for they shall obtain mercy. Blessed are the pure in heart, for they shall see God. Blessed are the peace-makers, for they shall be called the children of God. Blessed are they which are persecuted for righteousness' sake, for theirs is the kingdom of heaven. Blessed are ye when men shall revile you, and persecute you, and shall say all manner of evil against you falsely for my sake. Rejoice, and be exceeding glad, for great is your reward in heaven; for so persecuted they the prophets which were before you," Matt. v. 3—12.

It is possible that a belief of these truths, striking and momentous as they are, may float loosely in the understanding, without being efficacious. But they are exquisitely formed to affect us deeply; and whenever the secret links, which connect the understanding and the heart, are acted upon by the mysterious energy of him "who knoweth our frame," and all its hidden springs, this belief leads to that saving change which is called conversion. Then he who is the subject of it becomes "a new creature; old things are passed away, behold, all things become new." He has new apprehensions of things, new hopes, new fears, new joys, new affections, new employments, new prospects; he feels a perfect renovation of character; and his greatest solicitude is to be a "fellow-worker with God, and a fellow-heir with the saints."

The Christian religion, as portrayed in the Gospel, differs from all others, in furnishing an internal principle from which the purest conduct emanates. It is not a religion of forms and ceremonies, but the religion of the heart. The language of God to every Christian is, "My son, give me thine heart." The true Christian, as depicted in the New Testament, is a faithful and active servant,

who inquires what his Lord's will is, and performs it with cheerful alacrity. He considers it his duty, and finds it his delight, to please God, and render as far as possible his fellow creatures happy; to "add to his faith, virtue; and to virtue, knowledge; and to knowledge, temperance; and to temperance, patience; and to patience, godliness; and to godliness, brotherly kindness; and to brotherly kindness, charity." Still he walks as on the confines of the eternal world, and is anxious, therefore, to be "dead unto the world," and "alive unto God;" to attain more and more of the divine image; "to grow up to Christ in all things;" to enjoy "fellowship with God;" and, if he be risen with Christ, "to seek those things which are above, where Christ sitteth at the right hand of God."

Such are the dispositions and the employments which are required to be exemplified in the sincere Christian. He is exhorted to flee from a contrary temper and conduct, by the assurance that "the wrath of God abideth" on all those who reject the offers of the Gospel; and he is stimulated to persevere in the christian course, by the assurance that heaven is the inheritance of every sincere and humble follower of Jesus. He lives under the persuasion that, after he has passed through the "valley of the shadow of death," God will wipe away all tears from his eyes, and he will be no more exposed to pain or sorrow, to mourning or death. He believes that his spirit will be united to his glorified body in those delightful regions, where an enemy shall never enter, and from whence a friend shall never depart; where there will be satiety without disgust, day and no night, joy and no weeping, difference in degree and yet all full, "love without dissimulation," excellency without envy, multitudes without confusion, harmony without discord; where the understanding shall be astonishingly enriched, the will perfectly satisfied, the affections all transformed into love and joy; where "the Lamb, who is in the midst of the throne, shall feed him, and lead him unto living fountains of waters;" where God shall be the light and the glory of the place for ever and ever!

These, in brief, are the doctrines of the New Testament—the "fruits of the Spirit," manifested in those who believe; and the glorious expectations of a future world, which are intended at once to stimulate and to reward "a patient continuance in well-doing."

## Religious Sects.

The different sects or denominations of Christians may, for the sake of perspicuity, be thus classified:—1. Into sects whose

chief distinction is derived from doctrinal sentiments. 2. From the form of church government. 3. Miscellaneous sects, the distinctions of which are taken from both the above, conjointly, and connected with various other peculiarities. We can only notice the principal.

I. Sects whose primary distinction is taken from their doctrinal sentiments.

*Trinitarians.*—The believers of the doctrine of a Trinity, as generally understood to consist of three distinct and separate persons in one undivided Godhead—the Father, the Son, and the Holy Ghost. The word Trinity, from which they are named, is not to be found in the Bible, but is a scholastic term, derived from the Latin word *trinitas*, denoting a three-fold unity.

*Sabellians.*—So called from Sabellius, who founded this sect, and lived in the third century: he reduced the three persons in the Trinity to three characters, offices, or relations.

*Arians.*—This name is derived from Arius, a presbyter of Alexandria, who flourished about the year 315. The council of Nice was assembled by Constantine in the year 325, in consequence of the propagation of the doctrine of Arius. He owned Christ to be God in a subordinate degree, and considered his death to be a propitiation for sin. Some of the Arians believe him to have created the world, and they *all* support the opinion that he existed previous to his incarnation, though, in his pre-existent state, different degrees of dignity are assigned to him. Hence the terms of high and low Arians have been applied to them.

*Socinians.*—This name takes its rise from Faustus Socinus, who died near Cracow in Poland, about 1604. Socinians deny the pre-existence of Christ; and assert that, being born a man like ourselves, though gifted with divine wisdom in an eminent degree, the only objects of his mission were to inculcate the efficacy of repentance without an atonement, depending on divine mercy for pardon and acceptance—to exhibit in his own life a pattern for our imitation—to seal his doctrine with his blood—and by his resurrection to prove the certainty of ours at the last day. The Socinians have taken to themselves the appellation of Unitarians, and by this name they are now generally distinguished; yet they have no exclusive claim to it, as Trinitarians, and many Arians, are equally advocates for the divine unity.

*Calvinists.*—So called from John Calvin, a reformer, who taught at Geneva, about 1540. Their doctrines are predestination, original sin, particular redemption, irresistible grace, and the final perseverance of saints: these are called the Five Points. The leading feature of this system of religion is, that predestination is

absolute and unconditional from all eternity, and that God elected certain persons, before the foundation of the world, to eternal salvation and holiness of life. The Calvinists of the present day are to be found chiefly among the followers of Mr. Whitefield, the Baptists, and the Independents; though a very small portion of them maintain the above sentiments in an absolute and unqualified sense.

*Arminians.*—So called from Arminius, the disciple of Beza, who flourished about the year 1600. His tenets consist of five propositions, and are almost diametrically opposite to those of Calvin. He maintains, in the first place, that God has not fixed the future state of mankind by an absolute and unconditional decree. Secondly, That Jesus Christ made an atonement for the sins of all mankind in general, and of every individual in particular; but that none can partake of the benefits thereof, except those who believe in him. Thirdly, That man is not totally depraved, and that depravity does not come by virtue of Adam's being the public head, but that mortality and natural evil only are the direct consequences of his sin to posterity. Fourthly, That there is no such thing as irresistible grace in the conversion of sinners. And fifthly, That man may fall from faith, and forfeit, finally, his state of grace.

*Baxterians.*—Adherents of the famous nonconformist, Richard Baxter, an eminent Puritan, who died in the year 1691. He struck out a sort of middle path between Arminianism and Calvinism; believing with the latter that a certain number, determined upon in the divine counsels, will be infallibly saved; and with the former, he rejects the doctrine of reprobation as inconsistent and impious; and supposes that such a portion of grace is allotted to every person as renders it his own fault if he do not attain to everlasting life.

*Antinomians.*—This name is derived from two Greek words, which signify, *against a law;* the favourite tenet of Christians of this profession being, that the law is not a rule of life to believers. The term Antinomian has been frequently fixed on persons by way of reproach; and therefore many who have been branded with this name have repelled the charge. There are many Antinomians, indeed, in Germany, and other parts of the continent, and even in England, who condemn the moral law as a rule of life, and yet manifest a strict regard for the interests of practical religion.

II. Sects whose primary distinctions arise from church government, and the administration of ceremonies.

*Church of Rome.*—The following are the principal tenets of the church of Rome:—1. That Jesus Christ is one of the persons of

the most holy Trinity; that he came from heaven, took our nature upon him, and suffered death upon the cross. 2. That before he ascended to heaven, he invested the apostle Peter with the power of infallibility, and gave him the keys of heaven and hell, with a full power of remitting or retaining the sins of men. 3. That in the year of Christ forty-two, the apostle Peter went to Rome, and governed the church there as supreme bishop above twenty-four years, and was at last crucified with his head downwards. 4. The Roman Catholics formerly believed, that the same power and authority which was vested in the apostle Peter, descended to every succeeding bishop or pope of Rome, by an uninterrupted succession, who was considered as God's vicegerent, and supreme head of all nations, and of every nominal church on earth; having power to create or set up kings, and to depose them; to ordain bishops and priests, and to excommunicate them at pleasure: but within these few years the power of the pope has much decreased, and the most considerate of the Roman Catholics deny his supreme authority altogether. 5. They believe in purgatory, or place of fire, to purify the souls of the departed; and that the priests, by offering up or saying mass, can deliver their souls from this state of prison and misery, and transfer them into joy and bliss. 6. They believe that Jesus Christ, after he was crucified, descended personally into hell, and released from thence all the souls of the former saints. 7. They assert that the blessed Virgin Mary is the mother of God, and that she atones for the souls of them that adore and worship her on earth; therefore, her picture, with the pictures of other saints, ought to be held in great respect and veneration. 8. They believe in the efficacy of works of supererogation. 9. They believe that there are seven sacraments, namely, Baptism, Confirmation, the Eucharist, Penance, Extreme Unction, Orders, and Marriage. 10. They forbid the eating of flesh in the time of Lent, and on certain fast days; but notwithstanding their strict orders of abstinence and fasting, some will eat fish and other things. 11. They believe in the doctrine of transubstantiation; that is, after the priest has blessed or consecrated the bread and wine in the sacrament, the symbols or elements are no more bread and wine, but really the very body and blood of our Lord Jesus Christ.

*Greek* or *Russian Church*.—This bears a great resemblance to that of Rome, but they deny the Pope's infallibility and supremacy, and are in communion with the Patriarch of Constantinople. Three articles, among others, distinguish this church:—1. The rejection of images. 2. The doctrine of consubstantiation, or the union of the body of Christ with the sacramental element. 3. Baptism by

immersion of the whole body in water. It equals the latter church in ceremonies and customs, many of which are very superstitious; they have numerous fasts, and among the rest four lents. Endeavours have been used to unite them to the reformed church, but hitherto without success.

*Protestants.*—Under this appellation is included all who dissent from Popery, whether they reside in this or any other country, and into whatever sects they are divided. The name took its rise from their protesting against a decree of Charles V., in the year 1529. The Protestants originated at the Reformation, which was effected in the sixteenth century, by the pious and indefatigable labours of those splendid characters, Erasmus, Luther, Huss, Jerome of Prague, &c. The Protestants themselves are now divided into various sects, according to their peculiar forms of church government and administration of ceremonies.

*Church of England.*—This is the religion and worship, as by law established, in the realm of England. This church is governed by two archbishops, besides bishops and inferior clergy, of whom the king is supreme. The principles of this church are very particularly explained in the Thirty-nine Articles, printed and published in their Book of Common Prayer, or form and ceremonies of worship.

The following is a summary of its principles and manner of worship:—1. The church of England has thirty-nine Articles, of which some contain the matters of faith relating to the church of God; and others are civil articles, relating to its government, order, and discipline. 2. The first, second, third, fourth, and fifth Articles declare, that there is but one living and true God; that in the Godhead there are three persons, Father, Son, and Holy Ghost, all equal in power, majesty, and glory; that the Second Person in this Trinity took our nature upon him, and is both God and man united in one Christ; that he was crucified for us in the flesh, was buried, rose the third day from the dead, according to the Scriptures; that he ascended into heaven, and there makes continual intercession for us. 3. This church, in Article 9, admits the doctrine of original sin, and that by Adam's transgression, all mankind are tainted or infected with evil, have a natural inclination to sin, and therefore, are obnoxious to the wrath of God; and, in Article 10, that man's condition since the Fall is such, that he has no power, or free-will of himself, to do good works, acceptable to God, without the grace of God working with him. 4. The 11th Article affirms, that we are justified by faith only, and are accounted righteous before God, for or through the merits of Christ only; but the 12th recommends the practice of good works,

as the only proof of a true faith. 5. This church teaches us, in Article 13, that works done before justification, or before grace is given, cannot be pleasing to God, nor do such works make us meet to receive grace, as they spring not from a true and lively faith; and the 14th flatly denies the works of supererogation, and acknowledges, that when we have done all we can possibly do, we are still unprofitable servants. 6. The 17th Article treats of the doctrine of election and predestination. 7. The 18th Article says, that the church holds all persons accursed who will presume to say that any man is saved by the law, or by any sect, profession, or persuasion; and the 22d denies the Romish doctrine of purgatory, paying adoration to angels, and relics of saints. 8. The 27th and 28th Articles acknowledge two sacraments only, namely, Baptism and the Lord's Supper, and say, that after consecration the bread and wine are unchanged, and both are to be received by the faithful only, in commemoration of the body and blood of Christ, broken and spilt upon the cross. 9. The church holds infant baptism; requires godfathers and godmothers; and marks the child in the forehead with the sign of the cross by the finger at the font.

*Church of Scotland.*—The members of the Church, or Kirk of Scotland, comprise the principal body of Presbyterians in Great Britain. Their mode of ecclesiastical government was brought thither from Geneva, in 1572, by John Knox, the celebrated Scotch Reformer, who has been styled the apostle of Scotland, for the same reason that Luther was called the apostle of Germany. Contrary to the Episcopalians, the Presbyterians maintain that the church should be governed by Presbyteries, Synods, and General Assemblies. In the Kirk of Scotland there are fifteen Synods and sixty-nine Presbyteries. Their Articles are Calvinistic, and their General Assembly is held annually in the month of May, at Edinburgh.

The other sects in England who profess Protestantism, but dissent from the established church, are called Dissenters. They are divided into many sects, the principal of which are Presbyterians, Independents, and Baptists.

*Presbyterians* are those persons who deny episcopacy, or the government of the visible church by bishops; or those who assert that the church should be governed by elders or presbyters. Their tenets concerning God, the Trinity, the sufferings of Christ, &c., are nearly the same as those of the Church of England; and they baptize infants by sprinkling. The church of Scotland hold these sentiments, and there are many others of the same faith and order throughout England.

The *Independents,* or Congregationalists, deny not only the subordination of the clergy, but also all dependency on other assemblies. Each congregation, they say, has in itself what is necessary for its own government, and is not subject to other churches or to their deputies. This independency of one church with respect to another, has given rise to the appellation of Independents, which is specially applied to the regular congregational churches in England, though this mode of church government is adopted by many other dissenters.

The *Baptists* are divided into *general*, who are in sentiment Arminians; and into *particular*, who are Calvinists. Both, however, oppose the baptism of infants; they affirm that it is unscriptural, and that none are proper objects of this first sacrament but adult persons, and such as are capable of giving an account of their faith in Christ; and they believe that it is an ordinance that he enjoined all his disciples to follow. The government or discipline of the Baptists is like that of the Independents, by elders, or deacons, elected from their own particular community.

III. Miscellaneous sects, whose distinction has been derived both from doctrinal belief and church government.

*Methodists.*—This sect was founded about the year 1729, by Messrs. John and Charles Wesley, with whom, in 1735, was associated the celebrated Mr. Whitefield. However, in 1741, a separation took place; Mr. Wesley rejecting the doctrine of predestination, which Mr. Whitefield and his friends supported; since which time the Methodists have been divided into the Calvinistic and Arminian; but the term has been latterly almost exclusively assumed by the followers of Mr. Wesley, whose principles approach nearer to Arminianism than those of any other sect. Their form of church government is by a general conference.

*Quakers* are so called, because at first, when they spoke or preached, they had violent shakings or agitations. Their first leader was one George Fox, in the year 1650, who taught that the light within is more essential to guide men to heaven than the Holy Scriptures. This sentiment is now much modified, and they pay a great regard to God's word, but still deny the two sacraments, and all manner of ceremonies. They refuse to take an oath before a magistrate, and, therefore, are allowed to give their affirmation when called upon as witnesses. Their worship is somewhat abrupt, any person rising up to pray or preach according as he is moved. They are very plain and simple in their dress; and in order and discipline in governing their different assemblies and congregations, and in unity, harmony, and brotherly love, they equal any christian people or church in the universe.

*Moravians*, from Moravia, the country where they originated They are supposed to have arisen under Nicholas Lewis, Count of Zinzendorf, a German nobleman, who died 1760. They also style themselves Unitas Fratrum, or the United Brethren ; and, in general, to adhere to the Augsburg Confession of Faith. It is not easy to unravel the leading tenets of the Moravians. They direct their worship to Jesus Christ, addressing hymns even to the wound, or *hole*, in the side of the Saviour. They revive their devotion by celebrating agapæ, or love-feasts ; and the casting of lots is used amongst them to know the will of the Lord. The sole right of contracting marriages lies with the elders. In Mr. La Trobe's edition of Spangenburgh's Exposition of Christian Doctrine, their principles are detailed at length.

# APPENDIX.

## ABSTRACT OF PARLIAMENTARY REFORM BILL.

1 & 2 WILL. IV. PASSED SEPT. 21ST, 1831

### Principal Clauses.

1. Certain boroughs to cease to send members to parliament. 2. Certain boroughs to send one member only. 3. New boroughs hereafter to return two members. 4. New boroughs hereafter to return one member. 5 and 6. The boroughs of Shoreham, Crickdale, Aylesbury, East Retford, Melcomb Regis, Penryn, and Sandwich, to include certain adjacent districts. 7. Boundaries of existing boroughs in England to be settled. 8. Places in Wales, to have a share in elections for the shire towns. 9. Boundaries of certain places in Wales to be settled. 10. Swansea, Loughor, Neath, Aberavon, and Kenfig, to form one borough, and electors thereof not to vote for a member for Cardiff. 11. Description of the returning officers for the new boroughs. 12. Six members for Yorkshire,—two for each Riding. 13. Four members for Lincolnshire; two for Lindsey; and two for Kesteven and Holland.

14. Certain counties to be divided, and to return two for each division. 15. Certain counties to return three members each. 16. Isle of Wight severed from Hampshire, to return a member. 17. Towns which are counties of themselves to be included in adjoining counties for county elections. 18. No freehold for life to give a vote for a county, &c., unless worth 10*l.* per year, with exceptions. 19. Right of voting in counties extended to copyholders. 20. Right of voting in counties extended to leaseholders, and occupiers of premises of certain value above charges. 21.

What not to be deemed charges. 22. County voters need not be assessed to the land-tax. 23. Provision as to trustees and mortgagees. 24. No person to vote for a county in respect of any freehold house, &c. occupied by himself, which would confer a vote for a borough. 25. No person to vote for a county in respect of certain copyholds and leaseholds in a borough. 26. Possession for a certain time and registration, essential to the right of voting for a county with exceptions. 27. Right of voting in boroughs to be enjoyed by occupiers of houses, &c. of the annual value of 10*l*. 28. Provision as to premises occupied in succession. 29. As to joint occupiers. 30. Occupiers may demand to be rated.

31. Provisions as to freeholders voting for cities or towns, being counties of themselves. 32. Freemen not to vote in cities or boroughs unless residents, and exclusion of some. 33. Preservation of other rights of voting in boroughs. 34. Provisions as to persons now entitled to vote for New Shoreham, Cricklade, Aylesbury, or East Retford, in respect of freeholds. 35. Exclusion of certain rights of voting acquired since the 1st of March, 1831. 36. As to receipt of parochial relief. 37. Overseers to give notice annually, requiring county voters to send in their claims. 38. Overseers to prepare lists of county voters, and to publish them every year. 39. Notice of objection by third parties to persons not entitled to be retained in the county lists; and the lists of persons so objected to be published. 40. Lists of county voters to be forwarded to the clerks of the peace. 41. Judges of assize to name barristers to revise such lists.

42. Clerk of the peace and overseers to attend before the barristers, who shall retain on the county lists all names not objected to, and shall expunge those whose qualification, if objected to, shall not be proved. 43. Barristers to have power to insert in the county lists the names of claimants omitted by the overseers, on proof of claim and qualification. 44. Overseers to prepare lists of persons (other than freemen) entitled to vote in boroughs, and to publish them. 45. Provision for places within boroughs having no overseers. 46. Town clerks to prepare and publish the lists of freemen. 47. Persons omitted in the borough lists to give notice of their claim. 48. List of liverymen of London to be transmitted to the returning officer; notices to be given of omissions and objections in list of liverymen; poll of liverymen to be taken at Guildhall. 49. Judges of assize to name barristers who shall revise the lists of borough voters. 50. Barristers, on proof, to insert and expunge names. 51. Power of inspecting tax assessments and rate books. 52. Barrister, on revising the

lists, to have the power of adjourning, of administering oaths, &c., and shall sign the lists in open court. 53. Judges to appoint additional barristers in case of need.

54. County lists to be transmitted to the clerk of the peace; borough lists to be kept by returning officer, and handed to his successor. 55. Copies of the lists and registers to be printed for sale. 56. Expenses of overseers, &c., how to be defrayed. 57. Remuneration of the barristers for revising the lists. 58. No inquiry at the time of election, except as to the identity of the voter, the continuance of his qualification, and whether he has voted before at the same election; oath of voter; no scrutiny by returning officer. 59. Persons excluded from the register by the barrister may tender their votes at elections. 60. Correctness of the register to be questionable before a committee of the House of Commons. 61. Sheriffs of the divided counties to fix the time and preside at elections. 62. Commencement and continuance of polls at county elections.

63. Counties to be divided into districts for polling. 64. As to booths at the polling places for counties. 65. Provision as to sheriff's deputies, the custody of poll books, and final declaration of the poll for counties. 66. Sheriff in county elections may act in places of exclusive jurisdiction. 67. Commencement and continuance of polls at borough elections in England 68. Polling for boroughs in England, to be at several compartments, not more than 600 voting at one compartment in a booth; each person to vote at the booth appointed for his parish or district; if the booths are in different places, a deputy to preside at each place. As to custody and poll books, and final declaration of poll for boroughs. 69. Polling districts to be appointed for Shoreham, Cricklade, Aylesbury, and East Retford. 70. When returning officers may close the poll before the expiration of the time fixed. 71. Candidates or persons proposing a candidate without his consent, to be at the expense of booths and poll clerks. 72. Certified copies of the register of voters for each booth. 73. Powers of deputies of returning officers. 74. Regulations respecting polling, &c., for the borough of Monmouth, and for the contributory boroughs in Wales.

75. All election laws to remain in force, except where superseded by this act. 76. Penalties on officers for breach of duty. 77. Writs, &c., to be made conformable to this act. 78. This act not to extend to the Universities of Oxford and Cambridge. 79. Of the sense in which words in this act are to be understood; "city or borough." 80. In case the proposed Boundary Act shall not pass before the 28th of June, 1832, the preparations

for first registration to be deferred; but if the Boundary Act pass after that day, the periods preparatory to, and connected with the first registration, to be settled by an order in council. 81. In case of a dissolution of Parliament after the passing of the proposed Boundary Act, and before registration, the rights of voting shall take effect without registration. 82. In case of a dissolution of parliament before the passing of the proposed Boundary Act, counties not to be divided; boundaries of new boroughs defined; boundaries of old boroughs to remain; and the rights of voting to take effect without registration.

List of Disfranchised Boroughs according to Clauses 1 and 2, and forming Schedule A of the Reform Act.

| *Boroughs.* | *Counties.* |
|---|---|
| Old Sarum | Wiltshire |
| Bedwin, Great | Wiltshire |
| Newton | Isle of Wight |
| St. Michael's or Midshall | Cornwall |
| Gatton | Surrey |
| Bramber | Sussex |
| Bossiney | Cornwall |
| Dunwich | Suffolk |
| Ludgershall | Wiltshire |
| St. Mawes | Cornwall |
| Beeralston | Devonshire |
| West Looe | Cornwall |
| St. Germain's | Cornwall |
| Newport | Cornwall |
| Bletchingly | Surrey |
| Aldborough | Yorkshire |
| Camelford | Cornwall |
| Hindon | Wiltshire |
| East Looe | Cornwall |
| Corfe Castle | Dorsetshire |
| Hedon | Yorkshire |
| Plympton | Devonshire |
| Seaford | Sussex |
| Heytesbury | Wiltshire |
| Steyning | Sussex |
| Whitchurch | Hampshire |
| Wootton Basset | Wiltshire |
| Downton | Wiltshire |
| Fowey | Cornwall |
| Yarmouth | Isle of Wight, Hampshire |
| Queenborough | Kent |
| Castle Rising | Norfolk |
| East Grinsted | Sussex |
| Higham Ferrars | Northamptonshire |
| Wendover | Buckinghamshire |
| Weobly | Herefordshire |
| Winchilsea | Sussex |
| Tregony | Cornwall |
| Haslemere | Surrey |
| Saltash | Cornwall |
| Orford | Suffolk |
| Callington | Cornwall |
| Newton | Lancashire |
| Ilchester | Somersetshire |
| Boroughbridge | Yorkshire |
| Stockbridge | Hampshire |
| Romney (New) | Kent |
| Milborne Port | Somersetshire |
| Aldeburgh | Suffolk |
| Minehead | Somersetshire |
| Bishops's Castle | Shropshire |
| Okehampton | Devonshire |
| Appleby | Westmoreland |
| Lostwithiel | Cornwall |
| Brackley | Northamptonshire |
| Amersham | Buckinghamshire |

List of Boroughs, the Representation of which is reduced from two to one Member each, forming Schedule B of the Reform Act.

| *Boroughs.* | *Counties.* |
|---|---|
| Petersfield | Hampshire |
| Ashburton | Devonshire |
| Eye | Suffolk |
| Westbury | Wiltshire |
| Wareham | Dorsetshire |
| Midhurst | Sussex |

| *Boroughs.* | *Counties* | *Boroughs.* | *Counties.* |
|---|---|---|---|
| Woodstock . . | Oxfordshire | Horsham . . . | Sussex |
| Wilton . . . . | Wiltshire | Great Grimsby . | Lincolnshire |
| Malmesbury . . | Wiltshire | Calne . . . . | Wiltshire |
| Liskeard . . . | Cornwall | Arundel . . . | Sussex |
| Reigate . . . | Surrey | St. Ives . . . . | Cornwall |
| Hythe . . . | Kent | Rye . . . . . | Sussex |
| Droitwich . . . | Worcestershire | Clitheroe . . . | Lancashire |
| Lyme Regis . . | Dorsetshire | Morpeth . . . | Northumberland |
| Launceston . . | Cornwall | Helston . . . | Cornwall |
| Shaftesbury . . | Dorsetshire | North Allerton . | Yorkshire |
| Thirsk . . . . | Yorkshire | Wallingford . . | Berkshire |
| Christchurch . . | Hampshire | Dartmouth . . | Devonshire |

List of New Boroughs to return two Members each to Parliament, enacted by Clause 3, and forming Schedule C of the Reform Act.

| *Principal places to be Boroughs.* | | *Principal places to be Boroughs.* | |
|---|---|---|---|
| Manchester . . | Lancashire | Lambeth . . . | Surrey |
| Birmingham . . | Warwickshire | Bolton . . . . | Lancashire |
| Leeds . . . . | Yorkshire | Bradford . . . | Yorkshire |
| Greenwich . . . | Kent | Blackburn . . | Lancashire |
| Sheffield . . . | Yorkshire | Brighton . . . | Sussex |
| Sunderland . . | Durham | Halifax . . . | Yorkshire |
| Devonport . . . | Devonshire | Macclesfield . . | Cheshire |
| Wolverhampton . | Staffordshire | Oldham . . . . | Lancashire |
| Tower Hamlets . | Middlesex | Stockport . . . | Cheshire |
| Finsbury . . . | Middlesex | Stoke-upon-Trent | Staffordshire |
| Marylebone . . | Middlesex | Stroud . . . . | Gloucestershire |

List of New Boroughs to return one Member each to Parliament, enacted by Clause 4, and forming Schedule D of the Reform Act.

| *Principal places to be Boroughs.* | | *Principal places to be Boroughs.* | |
|---|---|---|---|
| Ashton-under-Lyne | Lancashire | Cheltenham . . | Gloucestershire |
| Bury . . . . | Lancashire | Dudley . . . . | Worcestershire |
| Chatham . . . | Kent | Frome . . . . | Somersetshire |
| Gateshead . . . | Durham | Tynemouth . . | Northumberland |
| Huddersfield . . | Yorkshire | Wakefield . . . | Yorkshire |
| Kidderminster . | Worcestershire | Walsall . . . . | Staffordshire |
| Kendal . . . . | Westmoreland | Warrington . . | Lancashire |
| Rochdale . . . | Lancashire | Whitby . . . . | Yorkshire |
| Salford . . . . | Lancashire | Whitehaven . . | Cumberland |
| South Shields . | Durham | Merthyr Tydvil . | Glamorganshire |

List of places which are to share in the Election of Members of Parliament, with the Shire-towns or Boroughs placed against their names, enacted by Clause 8, and forming Schedule E, No. 1, of the Reform Act.

| *Places sharing in the Election of Members.* | *Shire Towns of principal Boroughs.* | *Counties in which such Boroughs are situated.* |
|---|---|---|
| Amlwch . . .<br>Holyhead . .<br>Llangefni . . | sharing with Beaumaris . . . | Anglesea |

| *Places sharing in the Election of Members.* | *Shire Towns of principal Boroughs.* | *Counties in which such Boroughs are situated.* |
|---|---|---|
| Aberystwith, Lampeter, Adpar | sharing with Cardigan | Cardiganshire |
| Llanelly | sharing with Caermarthen | Caermarthenshire |
| Pwllheli, Nevin, Conway, Bangor, Criccieth | sharing with Caernarvon | Caernarvonshire |
| Ruthin, Holt, Town of Wrexham | sharing with Denbigh | Denbighshire |
| Rhyddlan, Overton, Caerwis, Caergwrley, St. Asaph, Holywell | sharing with Flint | Flintshire |
| Mold, Cowbridge, Llantrissent | sharing with Cardiff | Glamorganshire |
| Llanidloes, Welsh Pool, Machynlleth, Llanfillin, Newton | sharing with Montgomery | Montgomeryshire |
| Narberth, Fishguard | sharing with Haverfordwest | Pembrokeshire |
| Tenby, Wiston, Town of Milford | sharing with Pembroke | Pembrokeshire |
| Knighton, Rhayder, Kevinleece, Knucklas, Town of Presteigne | sharing with Radnor | Radnorshire |

## List of Places which are to share in the Election of Members of Parliament enacted by Clause 14, and forming Schedule E, No. 2, of the Reform Act.

| *Places sharing in Elections.* | *Places from which the 7 Miles are calculated.* |
|---|---|
| Newport | The market place |
| Usk | The town hall |
| Aberystwith | The bridge over the Rhedal |
| Lampeter | The parish church |
| Adpar | The bridge over the Teivi |
| Pwllheli | The guildhall |
| Nevin | The parish church |
| Conway | The parish church |
| Criccieth | The castle |
| Ruthin | The parish church called St. Peter's |
| Holt | The parish church |
| Rhyddlan | The parish church |
| Overton | The parish church |
| Caerwis | The parish church |
| Caergwrley | The parish church of Hope |
| Cowbridge | The town hall |
| Llantrissent | The town hall |
| Tenby | The parish church |

| *Places sharing in Elections.* | *Places from which the 7 Miles are calculated.* | *Places sharing in Elections.* | *Places from which the 7 Miles are calculated.* |
|---|---|---|---|
| Wiston . . . | The parish church | Swansea . . . | The town hall |
| Knighton . . . | The parish church | Loughor . . . | The parish church |
| Rhayder . . . | The market place | Neath . . . . | The town hall |
| Kevinleece . . . | The parish church | Aberavon . . . | The bridge over the Avon |
| Knucklas . . | The site of the ancient castle of Cnweglas | Kenfig . . . . | The parish church of Lower Kenfig |

List of Counties to be divided, and Members to be returned for each Division, according to Schedule F, and Clauses 12 and 13, of the Reform Act.

| | | | |
|---|---|---|---|
| Cheshire | Gloucestershire | Northumberlandshire | Surrey |
| Cornwall | Kent | Northamptonshire | Sussex |
| Cumberland | Hampshire | Nottinghamshire | Warwickshire |
| Derbyshire | Lancashire | Shropshire | Wiltshire |
| Devonshire | Lincolnshire | Somersetshire | Worcestershire |
| Durham | Leicestershire | Staffordshire | Yorkshire |
| Essex | Norfolk | Suffolk | |

List of Counties to return three Members each, enacted by Clause 14, and forming Schedule F 2, of the Reform Act.

| | | | |
|---|---|---|---|
| Berkshire | Cambridgeshire | Herefordshire | Oxfordshire |
| Buckinghamshire | Dorsetshire | Hertfordshire | |

List of Welsh Counties which formerly sent one, and are now to send two Members each to Parliament, according to Clause 15 of the Reform Act.

| | | |
|---|---|---|
| Caermarthen | Denbigh | Glamorgan |

List of Cities and Towns and Counties thereof, which are in future to form a part of the counties at large, in which they are included, enacted by Clause 17, and forming Schedule G in the Reform Act.

| *Cities and Towns, and Counties thereof.* | *Counties at large, in which Cities, &c. are to be included.* | *Cities and Towns, and Counties thereof.* | *Counties at large, in which Cities, &c. are to be included.* |
|---|---|---|---|
| Caermarthen . . | Caermarthenshire | London . . . | Middlesex |
| Canterbury . . | Kent | Newcastle-upon-Tyne . . . | Northumberland |
| Chester . . . | Cheshire | Poole . . . . | Dorsetshire |
| Coventry . . . | Warwickshire | Worcester . . . | Worcestershire |
| Gloucester . . | Gloucestershire | York and Ainsty | North Riding of Yorkshire |
| Kingston-upon-Hull . . . | East Riding of Yorkshire | Southampton . . | Hampshire |
| Lincoln . . . | The parts of Lindsey, Lincolnshire | | |

*Notice of Claim to be given to the Overseers.*

I do hereby give you notice, that I claim to be inserted in the list of voters for the county of [or for the riding, parts, or division of the county of as the case may be,] and that the particulars of my place of abode and qualification, are stated below. Dated the day of in the year

(Signed) JOHN ADAMS.

Place of abode, Cheapside, London.

*Notice of Objection to be given to the Overseers.*

To the Overseers of the parish of [or township, as the case may be.]

I hereby give you notice, that I object to the name of William Ball being retained in the list of voters for the county of [or for the riding, parts, or division of the county of .] Dated the day of in the year of

(Signed) A. B. of [place of abode.]

*Notice of Objection to Parties inserted in the List.*

To Mr. William Ball,

I hereby give you notice, that I object to your name being retained in the list of voters for the county of [or for the riding, parts, or division of the county of ,] and that you will be required to prove your qualification at the time of the revising of the said list. Dated the day of in the year

(Signed) A. B. [place of abode.]

*Notice of Claim.*

To the Overseers of the parish [or township] of or to the town clerk of the city [or borough] of [as the case may be.]

I hereby give you notice, that I claim to have my name inserted in the list made by you of persons entitled to vote in the election of a member [or members] for the city [or borough] of , and that my qualification consists of a house in Duke-street, in your parish, or otherwise [as the case may be ;]

[and in case of a freeman, say, and my qualification is as a freeman of , and that I reside in Lord-street, in this city or borough.] Dated the day of one thousand eight hundred and

(Signed) JOHN ALLEN, of [place of abode.]

*Notice of Objection.*

To the Overseers of the parish [or township] of or to the town clerk of the city [or borough] of or otherwise [as the case may be.]

I hereby give you notice, that I object to the name of Thomas Bates being retained in the list of persons entitled to vote in the election of a member [or members] for the city [or borough] of , and that I shall bring forward such objection at the time of the revising of such list. Dated the day of , in the year

(Signed) A. B. [place of abode.]

*Notice of Claim to be given to the Returning Officer or Officers of the City of London, and to the Clerks of the respective Livery Companies.*

To the returning officer or officers of the city of London, [or to the clerk of the company of .]

I hereby give you notice that I claim to have my name inserted in the list made by the clerk of the company of [or, in case of notice to the clerk, say, made by you] of the liverymen of the said company, [or, in case of notice to the clerk, say, of the liverymen of the company of ] entitled to vote in the election of members for the City of London. Dated the

(Signed) A. B. { Place of abode / Name of company.

*Notice of Objection to parties inserted in the List of the Livery.*

To Mr. William Baker,

I hereby give you notice, that I object to your name being retained in the list of persons entitled to vote as a freeman of the City of London, and liveryman of the company of in the election of members for the said city, and that I shall bring forward such objection at the time of revising the said list. Dated the day of

(Signed) A. B. [place of abode.]

## Abstract of Municipal Reform Bill.

5 & 6 Will. IV. chap. 76.—Sept. 9, 1835.

Repeals, all royal and other charters, grants, and letters patent to the boroughs, as particularized in the Act, so far as inconsistent with this Act. Reserves all rights of property, and beneficial exemptions to freemen, their widows and orphans, including all incohate rights. Freedom not to be acquired by gift or purchase. Parliamentary franchise reserved to freemen. "The Freemen's Roll" to be kept by the town clerk; to be examined, and copies furnished on payment. Corporations to be styled "The Mayor, Aldermen, and Burgesses."

Boundaries, as settled by the Parliamentary Reform Act, until altered by parliament. Places, precincts, or parts of districts included within boroughs or counties, are to be taken as part of the divisions wherein situated: proportional amounts of payments to be settled by award of barristers, &c.

Occupiers of houses, warehouses, counting-houses, and shops, rated for three years, if resident householders within seven miles, entitled to become burgesses; exclusive of aliens and receivers of parochial relief. Medical assistance and public instruction not to be deemed parochial relief. Occupiers may claim to be rated: where rates are payable by the landlord, claim of occupier not to be annulled thereby.

In titles by descent, marriage, &c., the time of rating to include the previous occupancy. Occupancy and payment of rates, the only grounds of claiming, to be enrolled. Exclusive rights of trading by retail, &c., wholly abolished. "The Burgess List" to be made out annually, September 15th. When no town clerk, persons doing duties of town clerk to act; where no overseers, such place to be described as belonging to neighbouring parish. Regulates notices as to omission of names, objections to names, and publication thereof: lists to be kept, consulted, &c., and sold at one shilling each. The mayor and two assessors chosen by the burgesses, to revise lists annually.

Mayor, aldermen, and counsellors, to be elected by the burgesses; one-third of the council to go out of office annually, but are re-eligible. Counsellors to be chosen November 1st annually. Barristers to appoint boundaries of wards; and also assign the number of counsellors, &c. Burgesses to elect counsellors and assessors in their respective wards. Bankruptcy, &c. to disqualify and displace, mayor, aldermen, and counsellors. If convicted of bribery, penalty 50*l.*, and disqualified from all elective rights. Persons offending, if they detect and convict others so offending,

to be themselves exempt from penalties. A watch committee to be appointed; constables of boroughs to act for the counties. The crown to appoint justices at pleasure. Stipendiary, if at request of councils; qualification not requisite; but not sit at gaol delivery, &c. Council to find "police officers." The Crown on petition may grant charters of incorporation.

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## RECEIPTS, MEMORANDUMS, &c.

### ELECTUARY FOR A COUGH.

Take of aniseed, liquorice, and elecampane powders, each half an ounce; of diapente, a quarter of an ounce; jalap powder one dram; mix them in a quarter of a pound of treacle, or honey, and take a tea-spoonful night and morning. This remedy has been found, by forty years' experience, particularly efficacious in a cough of long standing, but must not be used for one which arises from a recent cold.

### CURE FOR A RECENT COUGH AND COLD.

Put a large tea-cupful of linseed, with a quarter of a pound of sun raisins, and two pennyworth of stick liquorice, into two quarts of soft water, and let it simmer over a slow fire till reduced to one quart; add to it a quarter of a pound of pounded sugar-candy, a table spoonful of old rum, and a table spoonful of the best white wine vinegar, or lemon juice. The rum and vinegar should be added as the decoction is taken; for if they are put in at first, the whole soon becomes flat and less efficacious. The dose is half a pint, made warm, on going to bed; and a little may be taken whenever the cough is troublesome. The worst cold is generally cured by this remedy in two or three days; and if taken in time, is considered infallible. It is a fine balsamic cordial for the lungs.

### OILS FOR A SPRAIN.

Take of oil of John's wort, oil of swallows, oil of worms, oil of whelps, oil of camomile, and spirits of wine, each half an ounce; mix them together, and apply them to the part affected, with a feather, by the fire-side when going to bed; keep it moist with the oil, as fast as the fire dries it, for half an hour; and, in the most obstinate case, it will effect a cure in a few days.

### CURE FOR THE AGUE.

Take thirty grains of snake root; forty of wormwood; half an ounce of the best powdered Jesuit's bark; and half a pint of red port wine. Put the whole into a bottle, and shake it well together. It should be taken in four equal quantities, the first thing in the morning, and the last thing at night, when the fit is quite over. The quantity should be made into eight parts for a child, and the bottle should always be shaken before taking the medicine.

This medicine should be continued some time after the ague and fever have left.

### BLACKING.

Into three pints of small beer put two ounces of ivory black, and one pennyworth of brown sugar. As soon as they boil, put a dessert spoonful of sweet oil, and then boil slowly till reduced to a quart. Stir it up with a stick every time it is used; and put it on the shoe with a brush when wanted.

### GAS LIGHT ON A SMALL SCALE.

Take an ordinary tobacco-pipe, and nearly fill the bowl with small coals, and stop the mouth of the bowl with any suitable luting, as pipe clay, or the mixture of sand and common clay, or, as clay is apt to shrink, of sand and beer; and place the bowl in a fire between the bars of a grate, so that the pipe may stand nearly perpendicular. In a few minutes, if the luting is good, the gas will begin to escape from the orifice of the pipe; when, if a piece of lighted paper, or a candle be applied, it will take fire and burn for several minutes, with an intense light. When the light goes out, a residuum of useful products will be found in the bowl.

### COPAL VARNISH.

Melt slowly one pound of copal; add half a pint of boiling drying oil; when incorporated, add one pint of oil of turpentine made hot. You may add from half a pint to three pints of boiling drying oil, according to the consistence required.

THE END.

RICHARD CLAY, PRINTER, BREAD STREET HILL, LONDON.

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